GROUP DECISION SUPPORT SYSTEMS (GDSS) AND
INFLUENCE MODES: A COMPARATIVE FIELD STUDY
BETWEEN GDSS MEDIATED GROUPS AND
NON-GDSS MEDIATED GROUPS

THESIS

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THESIS

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L. Grant Bridgewater

Table of Contents

List of Figures

List of Tables

Abstract

This study examined the effect of Group Decision Support System (GDSS) technology on perceived influence modes. The researcher measured perceived influence modes in two group treatments: GDSS groups and non-GDSS (N-GDSS) mediated groups. Actual groups in both treatments performed judgmental tasks of their own choosing. Group members then completed a survey which measured their perceptions regarding five influence sources: expert influence, influence from legitimate authority, referent influence, reward influence, and coercive influence. The survey also measured the extent to which members perceived an "opportunity to influence" other group members. For each variable measured in both treatment groups, mean scores were calculated from respondents' ratings. Analysis indicated that GDSS technology significantly reduces the amount of influence perceived by group members when compared to members in N-GDSS groups. Results also indicated that there was no significant difference between treatment groups regarding members' perceived "opportunity to influence" other group members.

GROUP DECISION SUPPORT SYSTEMS (GDSS) AND INFLUENCE MODES:

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1. Introduction

Introduction

In today's ever-growing technological environment, managers have the option to use group decision support systems (GDSS) when making critical organizational decisions, conducting brainstorming meetings, or planning a course of action. GDSS technology is generally thought to generate "better" decisions by spurring more input and comments from group members. Furthermore, GDSS technology may give managers a wider range of options than traditional non-GDSS meetings, since the technology can be used by groups in a face-to-face (FtF) setting, groups in a distributed environment, or groups who meet at different times. Meetings that use a GDSS benefit from features of the technology. These benefits include member anonymity when communicating via computer and enabling more group members to access the communication medium. This technology provides a viable alternative to FtF meetings that are not supported by a GDSS (N-GDSS). Although many studies have examined the difference between GDSS and N-

GDSS group member interaction, there are still many unanswered questions regarding how this technology affects group dynamics.

As GDSS use becomes more prevalent in organizations, a greater understanding of this technology's benefits and disadvantages is required. Managers must comprehend the implications of using a GDSS to enhance FtF settings so they can properly use this technology in a group decision setting and capitalize on the benefits it provides. Since GDSS access is typically limited, managers should understand the specific effects GDSS technology will have on group dynamics and determine how they can best apply this technology to a particular group. In addition, a deeper understanding of GDSS effects on group dynamics would also benefit software designers who could add features that emphasize GDSS advantages and limit disadvantages.

Problem Statement and Purpose

A current trend in GDSS research is in the area of "influence"—how group members' influence may differ when using a GDSS as opposed to N-GDSS collaboration. Many researchers have studied the use of computer technology and different aspects of influence, to include Lea and Spears (1991), Lim, Raman, and Wei (1994), Saunders, Robey, and Vaverek, (1994), Hollingshead (1996), and Scott and Easton (1996). Previous research has not examined the various areas of influence itself—often focusing on only one aspect of influence or an overall perception of influence. These studies have often defined influence attempts in terms of specific actions and have measured how often these actions are repeated (see Lim, Raman, and Wei, 1994) or have asked group members which person influenced them the most in a GDSS environment (see Scott and

2

Easton, 1996). They have not examined the different kinds of influence as described by political scientists, particularly the sources of influence identified by French and Raven (1959). This study examines how GDSS technology affects the various influence modes.

To examine this study's research questions, quantifiable information has been obtained concerning group members involved in GDSS and N-GDSS settings. Information collected included various data regarding influence sources and perceived opportunity for member influence, as well as demographic data. The primary purpose of this project was to study which, if any, sources of influence are emphasized in GDSS groups as opposed to N-GDSS groups.

Research Questions

This study addressed two research questions regarding how GDSS technology affected the various types influence (i.e., also called "influence methods" or "influence modes") as defined by political scientists who have studied the construct at length (see French and Raven, 1959). By basing research on the theoretically-grounded influence construct described in the following chapter, this study examined if use of GDSS technology in the group decision-making process (as opposed to N-GDSS meetings) encourages one source of influence over another. This was done by comparing perceived sources of member influence between groups in a GDSS and N-GDSS setting. Finally, the study examined if a significant difference in perceived "opportunity to influence" of group members exists between N-GDSS and GDSS groups.

Therefore, this project studied variables of influence to determine if significant differences exist between actual groups in GDSS and N-GDSS settings. Research questions answered by this study are listed below:

1. Does GDSS technology enhance or mitigate different perceived social influence sources as opposed to a N-GDSS setting?

2. Does GDSS technology affect group members' perceived "opportunity to influence" other members as opposed to N-GDSS groups?

Background

What is a Group?

A group may be defined as two or more people who interact together so that any group member can influence and be influenced by every other group member (Fisher, 1974:17). In the group decision process, members must bring their knowledge and skills together to reach a decision. The ideal group decision is one where members effectively and thoroughly evaluate alternative choices, examine opinions and assumptions, base decisions on facts, and exert "positive" influence during the discussion (Hirokawa and Pace, 1983:363). To achieve an "ideal decision," conventional wisdom indicates that reliable group decision-making occurs when (among other things) interpersonal criticism is infrequent, nearly equal participation is obtained from group members, members focus on task completion, and a group agenda is followed (Fisher, 1974:13).

Emergence of Groups.

Increasingly, organizations are engaging in collaborative decision making. Several reasons have been credited as being responsible for this trend. Organizational structures such as matrix and project structures emphasize group work more than traditionally-structured organizations (Poole, Holmes, Watson, and DeSanctis, 1993:176). Managerial approaches to environmental changes also capitalize on group decision-making; approaches such as total quality management and business process reengineering advocate group interaction as a means to achieve business success (Hammer and Champy, 1993:103). DeSantis and Gallupe (1987) note that the need for knowledge increased in the post-industrial business environment, as did decision complexity and organizational change. As a result, "decision-related meetings" grew in both importance and frequency while the time available for well thought-out answers to complex issues actually decreased (DeSanctis and Gallupe, 1987:589). Furthermore, when making decisions, more participation was required to address these complex issues (DeSanctis and Gallupe, 1987:589). In response to demands of organizational structures, managerial approaches, and a post-industrial environment, collaborative efforts have gained greater importance. As a result more attention, responsibility, and power is placed on organizational group decision-making.

Group use of Electronic Media.

To increase the effectiveness of the group, organizations are utilizing electronic media to support daily operations. Poole notes that computer-supported communications technology like video-teleconferencing and electronic mail enhances group effectiveness

(1993:176). Not only are organizations enhancing daily operations, but they are utilizing computer technology in direct support of their decision-making processes. Although there are a variety of means to support group decisions, one of the most important technologies is the group decision support system (Poole, 1995:91). A GDSS allows groups to utilize computer and electronic communication technology along with decision techniques to enhance the decision-making process, exchange information, brainstorm, or conduct planning sessions.

The main objective of a GDSS is to facilitate the acquisition of group members' "collective intelligence" in regard to an issue (Er and Ng, 1995:77). Using a GDSS, anonymous presentation of ideas by group members eliminates many social cues prevalent in N-GDSS meetings. It is generally believed that such anonymity provides a more "open" environment, where ideas are examined based on their merits and are not subject to bias which may be directed toward specific group members. This open environment decreases interpersonal criticisms, and keeps members focused on the ideas generated (Er and Ng, 1995:78). To further facilitate gathering a groups' "collective intelligence," research has shown that GDSS technology eliminates production blocking by allowing members to access the communication medium equally (Valacich, Dennis, and Connolly, 1994:463).

Influence in the Group.

According to Keys and Case, influence is "simply the process by which people successfully persuade others to follow their suggestion, advice, or order" (1990:38). They also state that more emphasis is being placed on influence due to organizational changes, employee diversity, and reduced acceptance of formal authority (1990:38). By definition,

groups depend largely on influence (Fisher, 1980:17). Each member brings knowledge and skills to the group. Likewise, each person has some ability to influence other members of the group, and is subjected to other's attempts to influence him or her.

It is important to note that the process of influencing others is, in itself, neither inherently good or bad. However, influence attempts by group members may be promotive, disruptive, or counteractive – depending on how well the influence attempt enables the group to make reasonable decisions (Gouran, 1983:176). In addition, there are numerous techniques group members can use to influence other members. Like influence itself, none of these techniques are inherently good or bad. The act of influencing or the techniques used to influence others are dynamic attributes – group members can choose to exert influence in a limited number of ways. These sources of influence tend to be static (French and Raven, 1959:156). Each member brings some influencing ability to a group that is recognized by other group members whether it be expertise, formal authority, personal charisma, or other influence source.

A person may, or may not, exert influence on the group; this is a decision of each member. Members bring their influencing abilities to bear when attempting to influence others. While these influencing abilities cannot be not "given," "taken away," or "equalized" in N-GDSS meetings, research should examine how GDSS technology may affect these abilities.

Operational Definitions

This study employed statistical analysis to determine information regarding influence as it applied to actual (as opposed to "experimental" or "ad hoc") group

members in N-GDSS settings and those using GDSS technology. The kind of setting used by actual groups, either N-GDSS or GDSS, comprised the main independent variables of the study. In addition, some demographic information was collected. Dependent variables consisted of individual group member's survey responses regarding aspects of perceived influence.

One of these aspects concerns influence sources. To determine if GDSS technology enhances or impedes various influence modes, the "sources" of influence were based on previous theoretical works. Five influence sources were identified by French and Raven in their essay *The Bases of Social Power* (1959:150). These five sources of influence are 1) reward, 2) coercive, 3) legitimate, 4) expert, and 5) referent. Chapter 2 describes each of these influence sources and defines them as they are used in this study. Another aspect of influence was a group member's perceived "opportunity to influence" other group members. Since active participation from all nearly members is an important aspect of group effectiveness (Fisher, 1980:272), and since members participate by attempting to influence others (Fisher, 1980:17), the opportunity to influence other members is an important aspect of group dynamics.

Hypotheses

This research examined the difference between the independent variables of separate group settings (N-GDSS and GDSS) and the dependent variables of influence survey responses. For the purposes of this study, the researcher examined five hypotheses to determine the relationships between the independent and dependent variables. These hypotheses were derived primarily after conducting an extensive review of literature which

is described in Chapter 2. The hypotheses tested in this study are listed below after the

research question they address:

Research Question 1:
Does GDSS technology enhance or mitigate different perceived social influence
sources as opposed to a N-GDSS setting?

Hypothesis 1:   Group members using GDSS technology perceive more
expert influence than members in N-GDSS groups.

Hypothesis 2:   There is no difference between groups using GDSS
technology and N-GDSS communication regarding the
perceived influence of legitimate authority.

Hypothesis 3:   Group members using GDSS technology perceive less
referent influence than members in N-GDSS groups.

Hypothesis 4:   Group members using GDSS technology perceive less
reward and coercive influence than members in N-GDSS
·groups.

Research Question 2:
Does GDSS technology affect group members' perceived "opportunity to influence"
other members as opposed to N-GDSS groups?

Hypothesis 5:   Group members using GDSS technology perceive a greater
opportunity to influence others than do N-GDSS group
members.

Scope

The examination of group member's sources of influence and perceived

opportunity to influence other group members occurred by studying the results of

personnel who participated in N-GDSS meetings and meetings supported by GDSS

technology. The researcher used a survey to obtain data from members in each group

category during the period of August-October 1997. From the statistical analysis of this

information, conclusions were reached regarding the dependent variables and the type of group setting utilized.

Summary

Groups are taking a central role in today's organizations. Responding to the complex, turbulent technological and business environment, groups are inheriting more decision-making responsibility than ever before. Group decision support systems are an important technology in enhancing group effectiveness. While many studies have revealed the effect GDSS technology has on group dynamics, a new trend in GDSS research addresses around the topic of influence. Research should reveal how GDSS technology enhances or impedes the various sources of influence available to members, as well as its effect on each members' opportunity to influence others. The following chapter will provide further insight into influence sources, influence opportunity, and describe the results of other studies relevant to this particular analysis.

2. Literature Review

Introduction

As discussed in Chapter 1, group-work is pervasive in today's work environment. Organizations have adopted flexible structures such as the dynamic network, project form, and matrix structure in response to ever-changing technologies, products, and markets. These new organizational designs place greater emphasis on the effort of groups and teams than did previous organizational structures (Poole, Holmes, Watson, and DeSanctis, 1993:176). The Air Force, like organizations in both the private and public sector, has also adopted many of these organizational designs to enhance operations. Increasing dependence on group work requires that managers understand group dynamics. Understanding how group members interact with each other in various settings can enable the manager to maximize group effort.

In this chapter the researcher addresses four topics. The first topic examines why the subject of "influence" is important to group dynamics. The second topic discusses the theoretical framework behind understanding how group members influence one another, including the operational definitions used in this research. The third topic introduces research studies examining influence and GDSS technology, followed by a literary review of group influence effects in these and related studies. The fourth topic discusses the limitations of previous research efforts and introduces the study's methodology, described in the following chapter.

The Importance of "Influence"

For any group to operate effectively its individual members must actively participate in the task at hand (Fisher, 1980:272). Group work capitalizes on the communicative behavior of individual members (Fisher, 1980:20). Each member, by virtue of being in the group, is provided with an opportunity to influence the other group members via his or her communicative behavior (Fisher, 1980:99). The influence members exert on one another is essential to productive group work. Keys and Case argue that today's diverse employees are becoming increasingly interdependent on each other, reducing the effectiveness of organizational authority. They state that the "authority gap" must be replaced with "influence"—the process by which people successfully persuade others to follow their suggestion, advice, or order" (Keys and Case, 1990:38). For this reason, understanding the different influence modes and the conditions under which they emerge and are effective is important (Kelly, Johnson, and Hutson-Comeaux, 1997:21).

This focus on the study of influence comes at a time when organizations are exploring the use of technology to improve the effectiveness of their groups. Technologies such as electronic mail, computer conferencing, collaborative writing tools, and group decision support systems "appear to have the potential to promote timely and reflective communication and decision making in far-flung organizations" (Poole, Holmes, Watson, and DeSanctis, 1993:177). Furthermore, during the past 15 years, the role of information systems have shifted from transaction-based processing systems to supporting complex decision-making (Er and Ng, 1995:75). Coupled with the fact that important organizational decisions are made by groups, the GDSS puts computerized decision

12

support technology in the hands of group members (Er and Ng, 1995:76). Knowing how this technology affects group dynamics, particularly group influence, is an important issue.

Theoretical Framework: How Do You Examine Influence?

Of course, a systematic approach regarding the different kinds of influence must be used in order to study influence itself. Influence is a relational process: It occurs when one person successfully persuades another to accept his suggestion, advice, or order. For the influence process to occur, the traditional components of communication must be present: a sender, a message, and a receiver (Bernier and Yerkey, 1979:170). Since social psychologists have shown that group members can be influenced just as easily by a sender's "social prestige" as they are by compelling logic, it is necessary to identify the factors that comprise various influence modes for study (Tedeschi and Bonoma, 1972:23). This suggests that influence can stem from message content and/or from social interaction between group members.

Many theoretical approaches have been used to examine influence. Bernier and Yerkey describe the Yale Approach to Communication and Persuasion model published by Hovland, Janis, and Kelley in 1953, shown below in Figure 1. This model was used to identify independent variables having to do with sender, message, and receiver, and to measure the effects of these variations on attitude change" (Bernier and Yerkey, 1979:170). However, their model (presented below in Figure 1. Yale Approach to Communication and Persuasion) deals primarily with written communication.
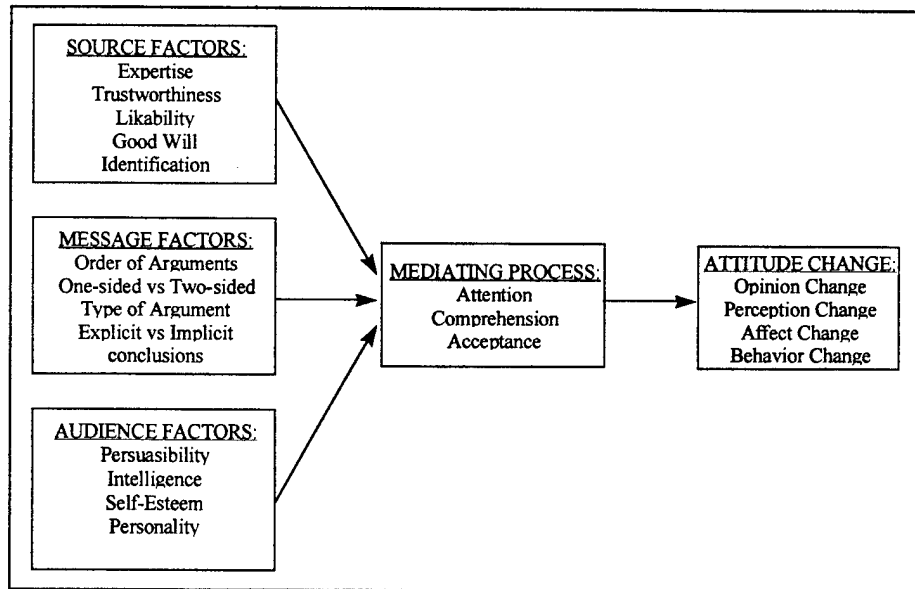
Figure 1. Yale Approach to Communication and Persuasion

In 1965, Raven proposed a model of influence that had been widely accepted, describing influence as either "socially-dependent" (normative influence) or "socially-independent" (informational influence). Socially-dependent influence is that where a receiver is influenced primarily by the persons and their positions" rather than on the message itself (Kelly, Johnson, and Hutson-Comeaux, 1997:11). Socially-independent influence, on the other hand, is when a receiver is influenced by the content of the message instead of the sender. Raven argued that this "independent influence is the result of a basic change in cognitive elements and [the basis of the influence] is information communicated by the agent. It is the content of the communication that is important, not the nature of the influencing agent" (Raven, 1965:372). However, recent research suggests that socially-dependent and independent influence are not mutually exclusive and are difficult to examine separately in a field study (Kelly, Johnson, and Hutson-Comeaux, 1997:11).

In 1972 Tedeschi, Bonoma, and Schlenker proposed an influence model known as the Subjective Expected Value (SEV) model of influence. Like previous models, the SEV model presented by Tedeschi, Bonoma, and Schlenker (1972b:357) examined the relationship among the sender, message, and receiver (see Figure 2). The researchers emphasized sender characteristics as the determining factor in the receiver's reaction to the message. The model, however, applied only to a person "who must decide between two states, X and Y, and has no other possible choices" (Tedeschi, Bonoma, and Schlenker, 1972:352). While the model was used to investigate influence theory, the dyadic assumption does not reflect the reality of complex decision making in a group environment.

Independent Variables	Target Cognitions	Predictor Variables	Dependent Variables
History of Reward and/or Degree of Attitudinal Similarity	Attraction		
Slack Resources x Source Intentions	Prestige	Subjective Expected Value	
Expertise of the Source	Esteem		
Legitimate Authority (role position)	Status	SEV for Decision Alternative	Compliance, Conformity; Attitude Change, Response Frequency, Imitation
Message Credibility x Magnitude of Reward or Punishment	Expected Value of the Message		

Figure 2. Subjective Expected Value Theory of Social Influence

In 1959, French and Raven proposed a model that is used as the theoretical framework for the present study. Like the SEV model, it examines influence from the viewpoint of the target and also relied heavily on sender characteristics. This emphasizes the relationship between the sender and receiver, the crux of the influence process

(Tedeschi and Bonoma, 1972:21). Unlike the SEV model, however, the number of possible decision outcomes is not relevant. Therefore, this model can be applied to complex group discussions.

The influence process occurs as the receiver experiences a psychological change resulting from sender characteristics, described in the following excerpt from French and Raven. Also, this relationship between "O" and "P" below (O = message sender, P = message receiver) is visually depicted in Figure 3 below.

> Our theory of social influence and power is limited to influence on the person, P, produced by a social agent, O, where O can be either another person, a role, a norm, a group, or a part of a group. (French and Raven, 1959:151)

> By the basis of power we mean the relationship between O and P which is the source of that power. ...we shall here define five which seem especially common and important. These five bases of O's power are: 1) reward power, based on P's perception that O has the ability to mediate rewards for him; 2) coercive power, based on P's perception that O has the ability to mediate punishments for him; 3) legitimate power, based on the perception by P that O has a legitimate right to prescribe behavior for him; 4) referent power, based on P's identification with O; 5) expert power, based on the perception that O has some special knowledge of expertness. (French and Raven, 1959:155-156)
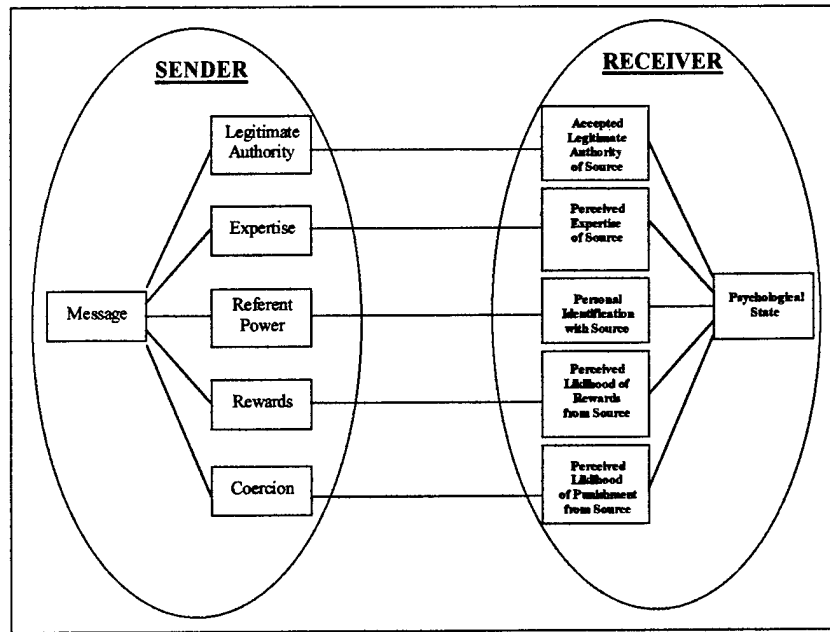
Figure 3. French and Raven's Sources of Social Influence

According to the model, influence occurs when the sender uses his power to bring about a psychological change in the receiver. French and Raven described this relationship, saying that "influence is kinetic power, just as power is potential influence" (1959:152). A sender may not bring all his "potential influence" to bear on a receiver in order to cause a psychological change in the receiver. Also, as Griffin notes, "Power is the ability to affect the behavior of others…without actually using it (power)" (1996:507). French and Raven also understood this phenomenon, commenting that a receiver could be influenced by a sender's power without "conscious behavior" from the sender (French and Raven, 1959:152). In addition, the influence process can be a complex one. French and Raven admitted that receivers are normally influenced by several of the sender's power characteristics at once (1959:155). Thus, only the receiver can accurately describe what sender characteristics have brought about the psychological change which consummates the influence process.

17

The French and Raven theory of social influence succinctly defined the influence process as it relates to group interaction. In addition, the five sources of influence they described are often identical to those proposed in the models presented by Bernier and Yerkey (1979) and Tedeschi, Bonoma, and Schlenker (1972b) mentioned above, which lends credibility to French and Raven's model. For these reasons, the French and Raven model was selected as the theoretical framework for the present study.

Operational Definitions

This paper examined the effects of GDSS technology on influence as defined by French and Raven as opposed to groups in a N-GDSS setting. The five sources of influence, according to French and Raven, are 1) Expertise, 2) Legitimate Authority, 3) Referent Power, 4) Rewards, and 5) Coercion. These variables are operationally defined here.

Expertise is operationalized as the extent to which the receiver perceives and self reports the sender as someone having knowledge in a "given area," which typically comes from experience (French and Raven, 1959:163). Furthermore, according to Griffin, expertise is "derived from information" (1996:508). In a group setting, therefore, influence caused by this variable is the perceived knowledge, information, or experience receivers attribute to other group members.

Legitimate authority is operationalized as the extent to which the receiver reports that he/she has accepted the sender's right to influence him and that he is obligated to obey the sender (French and Raven, 1959:163). Legitimate authority is typically granted through an organizational hierarchy, but must be accepted by the receiver to be a source

18

of influence (Griffin, 1996:508). In the military environment, legitimate authority can be indicated by the rank or grade of an individual and the position or job held by an individual.

Referent influence is operationalized as the extent to which the receiver reports identifying with the sender. This is also described as a "feeling of oneness," a "high attraction," and a "close association" between receiver and sender (French and Raven, 1959:161). It is clear that this influence occurs as a result of a personal, internal attraction of the receiver toward the sender—not a relationship that occurred from external (i.e., organizational) means. In a group setting, therefore, receivers may be influenced by someone they personally identify with, a person they respect personally, or someone they consider to be a mentor or a friend.

Reward influence is defined as the sender's ability to extend positive valences or remove negative valences for the receiver (French and Raven, 1959:156). To operationalize this concept, the receiver must recognize and report the sender's power to administer rewards, and must also consider the likelihood of receiving rewards offered by the sender. While managers can use rewards such as salary increases, bonuses, promotions, etc. to influence subordinates in a general organizational setting, individuals may experience more short-term incentives or enticements in a group setting—such as promises of help with a task.

Coercive influence is defined as a receiver's expectation that the sender will punish him if he refused to "conform to the influence attempt" (French and Raven, 1959:157). In a group environment, coercion can take the form of a psychological, emotional, or physical threat" (Griffin, 1996:507). Group members may report when they have been

19

subjected to threats of punishment or sanctions by others in an attempt to cause a psychological change.

In addition to the sources of influence defined above, this work studied differences between these group settings and a group member's perception of his "opportunity to influence" other group members. If an individual perceives that he has a greater opportunity to influence other group members in a given setting, then he may transform more "potential influence" into "kinetic influence." Falk and Falk learned that an employees' "willingness to influence the outcome of the discussion depends, too, on their perception of whether they have a chance to influence it" (1981:219). Members may believe they have a greater opportunity to influence others if they think their input will be completely discussed, that each member has an equal opportunity to make influence attempts, and that more group members are influencing him.

Group Influence Studies: A Review of Literature

Over the years, many researchers have investigated the nuances of how group members influence each other. This research is helpful in understanding which influence modes are most prevalent between members of a group. This section reviews the relevant literature to examine how group members influence each other and investigate what impact GDSS technology may have on influence attempts within groups.

Research Examining GDSS Technology and Influence.

Despite the encouragement by DeSanctis and Gallupe to examine the impact of GDSS technology upon the influence process (1987:606), few studies have actually examined this aspect in detail. Dubrovsky, Kiesler, and Sethna investigated the

20

"equalization phenomenon," in which expertise among group members tends to be equalized when using GDSS technology (1991:120). They also noted that "status" differences are also reduced when groups use electronic communication (1991:138). Lim, Raman, and Wei examined the influence attempts by group leaders whose "authority" was determined by member election (1994). Their study indicated that persons in positions of authority tended to exert more influence attempts than other group members despite the use of GDSS technology (1994:206). Scott and Easton (1996) examined the extent to which the perceived influence of group members is equalized when using GDSS technology, concluding that significant differences still exist between "high-" and "low-influential" group members using a GDSS (1996:374). Although not directly examining influence, per se, Hollingshead (1996) researched the impact of GDSS technology upon the effectiveness of group decisions when expert information was dispersed. None of these studies examine the effect of GDSS technology upon the variety of social influence modes group members use.

Presence of Influence Sources in Groups.

Influence attempts are found in all groups. Naturally, groups rely on the influence process to be productive. Members must influence each other to identify problems, evaluate alternatives, and reach decisions. It is important to note, however, that influence is not an asset that is shared equally among group members—some members are naturally "more influential" than others. Hirokawa and Pace found that "every group tended to possess a member (or members) who somehow possessed the ability to influence effectively the line of thinking and discussion of the group" (1983:373). This influential

member had a significant impact on the quality of a group's decision, depending on whether he/she exerted "positive, facilitative influence" or "negative, inhibitive influence" (1983:373). The type of influence used by influential members was irrelevant; rather, what was important was how these members used their influence. In addition, Falk and Falk noted that members with more power also have more opportunities to influence a group than members with less power. They stated that powerful members do not need to "verbalize their positions continuously in order for low power members to reduce their support for their own ideas" (1981:212). Furthermore, high-power group members communicate more frequently and tend to be the receiver of messages more frequently than members with low power (Hurwitz, Zander, and Hymovitch, 1968:295). These studies indicate that influential and powerful members can exert more social influence to affect the outcome of group actions.

Unfortunately, it is difficult to determine if a highly-influential group member will use his influence in a facilitative or inhibitive manner in any given situation. What can be determined, however, is which characteristics make group members more or less influential than others. While this does not assure that the influence will be "positive" on the group, it may enable the manager to emphasize influence characteristics he believes are "more desirable" in a group setting.

Influence Characteristics.

Persons whom others consider to possess expertise, authority, or referent power can often use this power to influence other group members. Researchers have learned that managers in dominant organizational positions are more likely than subordinates to assert

their authority and also "use a greater variety of influence strategies than those with less power" (Kipnis, Schmidt, Swaffins, and Wilkinson, 1984:62). Student (1968) learned that legitimate authority was the main reason subordinates complied with supervisory directives in a work group environment (193). Furthermore, persons with greater organizational authority used a wider array of influence techniques than did subordinates (Keys and Case, 1990:39). Therefore, group members with more organizational authority are in a stronger position to influence group outcomes. Expertise was found to be the most frequently used tactic to persuade superiors, subordinates, and coworkers alike (Keys and Case, 1990:39; Kipnis, Schmidt, Swaffins, and Wilkinson, 1984:62). Group members who are perceived to possess great referent power use this perceived status to make more influence attempts than those with less referent power (Lippitt, Polansky, Redl, and Rosen, 1968:244). The combination of expert and referent power—known as "incremental power"—has been found to positively relate to group performance measures (Student, 1968:193; Ivancevich and Donnelly, 1970:547). In addition, persons who "control valued resources" can use these resources to exert influence over others (Kipnis, Schmidt, Swaffins, and Wilkinson, 1984:62). Therefore, numerous studies indicate that persons with legitimate, expertise, referent power, and are able to extend (reward) or withhold (coerce) resources can exert more influence than other group members.

GDSS Effect on Group Influence.

The studies above indicated that some group members are more likely than others to influence group outcomes based on certain characteristics. These characteristics are the same ones described by French and Raven in their model of influence. Researchers have

learned that group influence can be altered by a number of circumstances, such as the decision rule used by the group and the type of task addressed by the group (Falk and Falk, 1981:219; Kelly, Johnson, and Hutson-Comeaux, 1997:19). Many studies, however, neglect to investigate the medium used as it effects influence attempts. As DeSanctis and Gallupe noted, "the impact of decision support systems on power and influence processes...should be a major study for GDSS research" (1987:606). These researchers argue that using GDSS technology will lead to "improved decision quality" while diminishing "extraordinary influence by one member" or the group (1987:605).

Since this call to action, several studies have examined various aspects of how GDSS technology affects the influence of group members. Researchers have often used "status" and "participation" as a substitute for influence. But these three concepts are not identical. A person who dominates the group dialogue is not, by default, exerting more influence than another member who speaks less often. The same reasoning applies to the concept of "status." It is important to note, however, that the existing research does provide insight regarding how GDSS technology may affect the different influence modes defined previously.

Expert Influence.

Researchers have suggested that GDSS technology will lead to decisions based on knowledge and expertise (Er and Ng, 1995:78). The aspect of individual anonymity in GDSS technology is expected to result in decisions base primarily on "merit" than other influence modes (Er and Ng, 1995:78). As stated by DeSanctis and Gallupe, "the loss of social cues due to electronic communication can be expected to encourage open input of

creative ideas, discovery of optimal solutions, and selection of an alternative based on its merits rather than on compromise" (1987:605).

Despite these hopes, empirical research in this area has not confirmed this assumption. Studies indicate, however, that GDSS use can result in "information suppression." Hollingshead examined this phenomenon using 53 three-member groups. Group members were provided different clues to a mystery, separated, and tasked to determine the guilt or innocence of fictitious characters based on their collective information. In addition to both GDSS and N-GDSS treatments, teams were further divided into "equal" and "mixed-status" groups. Critical information was given to the "low-status" member in the mixed-status groups, enabling Hollingshead to examine the use of "expertise." Findings showed that groups using GDSS technology were less likely to make the right decision than N-GDSS groups (1996:205), and the perceived influence of members with critical information was diminished in groups using a GDSS (1996:210). Despite benefits of anonymity and equal access to the communication medium in GDSS groups, Dennis found that use of a GDSS did not significantly increase the amount of information exchanged by group members (1996:357). These studies indicate that the computer, as a group communication medium, can suppress information and may not increase information exchange as hoped.

Experimental restrictions in these studies played an important part in how members communicated their influence attempts. Hollingshead's experiment forced GDSS groups to communicate only via computer. This aspect of her research is a departure from how groups actually use GDSS technology—actual groups often use verbal communication as well as computer communication. In the Dennis study, the ad hoc groups were allowed to

communicate verbally but failed to do so. This point is critical in the current study. Computerized communication enables all members to impart their expertise to others. Allowing members to discuss these knowledgeable comments verbally should minimize any information suppression that results from the GDSS, as seen in the Hollingshead study.

What the Hollingshead and Dennis studies do not address, however, is what kind of influence is promoted by the GDSS. Research by Dubrovsky, Kiesler, and Sethna found that GDSS use can lead to equalization of expert influence. These researchers conducted a GDSS experiment using a methodology similar to that used by Hollingshead. The study examined how high-status members exerted influence in GDSS and N-GDSS treatments, concluding that status and expertise inequalities were reduced in groups using a GDSS (1991:120). Thus, when using a GDSS, the expertise of all group members appears to be equalized—the group considers knowledge of more than just a few expert persons. As Falk and Falk remarked, a group member's "willingness to influence the outcome of the discussion depends on their perception of whether they have a chance to influence it" (1981:219). The Dubrovsky, et.al, study indicates that access to a GDSS does increase this perception, since "low-expertise" group members are considered "more knowledgeable" in this environment. This feature should result in group members exerting a greater amount of expert influence when using a GDSS. Actual groups, unrestricted by experimental restrictions, will be able to exert expert influence verbally in addition to via computerized communication. Therefore, although no assurances can be made regarding the effectiveness of the decision, groups using GDSS technology should experience more expert influence than N-GDSS groups.

Hypothesis 1:   Group members using GDSS technology perceive more expert influence than N-GDSS group members.

Influence from Legitimate Authority.

As stated previously, persons who possess legitimate, organizational authority may exercise more influence than group members who do not. Group members with this legitimate authority can affect the meeting structure, and may also cause an "unequal distribution of influence" within the group (Lim, Raman, and Wei, 1994:200). Researchers have noted that the dominance of superiors may result in "poor and inefficient problem-solving" (Falk and Falk, 1981:213). Therefore, it could be beneficial to minimize the greater influence exerted by members who possess legitimate authority.

The ability of GDSS technology to minimize the influence cause by legitimate authority is arguable. Another proposed benefit of GDSS anonymity is that "extreme influence of high-status members can be avoided" (Er and Ng, 1995:78). However, Spears and Lea believed that GDSS technology does not minimize this influence. They assert that "the relational nature of power implies that its subjects will already be aware of this relation in the absence of any outward social cues; the subordinate will know who his or her superior is independent of the communication medium" (1994:434). If true, this would undermine the argument that computer technology will minimize influence based on legitimate authority.

Research addressing this area appear to confirm these suspicions. Spears and Lea base their views on their 1991 study regarding the effect of computer communication on group norms. In this study, some students were placed in a "group" treatment where researchers stressed the importance of group membership, while other students were

placed in an "individual" treatment that stressed their participation as individuals. Using an electronic mail system they learned that, if individuals see themselves as members of a group or team, they tend to accept pre-established group norms despite the aspect of anonymity (Lea and Spears, 1991:296). This occurred even though students in the "group" treatment who used the electronic mail system did so in different locations and without using alternative means of communication. Group norms often include submission to legitimate authority found in an organizational hierarchy, and group members rely on shared norms when operating in a group environment (Bettenhausen and Murnighan, 1991:32). Lim, Raman, and Wei learned that a group leader, who possessed "legitimate authority" by being formally elected by other group members, was still able to exert more influence attempts than others despite the use of a GDSS (1994:206). These studies suggest that legitimate authority, as an accepted group norm, may still persist despite GDSS use.

Another study regarding this aspect of influence was performed by Saunders, Robey, and Vaverek. This study examined the use of computer conferencing systems over a 13-month period by persons in high-status and low-status occupational roles. Although the system used was different than a GDSS, researchers learned that existing communication patterns persisted despite the use of electronic communication. Group members in high-status occupational roles communicated more frequently with others of the same occupational role, sent more sentences, and initiated more interaction than members in low-status occupational roles (1994:466). Computerized communication did not reduce the effect of position in the study, and the researchers commented that "occupational role distinctions may be resilient in the face of computer conferencing

28

media" (1994:469). With this information in mind, GDSS technology may not minimize the effects of influence asserted via legitimate authority.

> *Hypothesis 2:*   There is no difference between groups using GDSS technology and N-GDSS communication regarding the perceived influence of legitimate authority.

Referent Influence.

When a person believes another group member is a close friend, a mentor, or a charismatic individual, he or she may be acceptable to "referent influence" as a result of the high personal esteem attributed to the group member. This occurs since people can personally "identify" with others for reasons having nothing to do with "pressures toward uniformity" that may result from expertise, legitimate authority, or the ability to reward or punish others (French and Raven, 1959:162).

According to Falk and Falk, mitigating "forces in the social dimension," such as referent influence, may be useful to improve task performance (1981:212). In a group discussion, it is optimal for members to remain focused on the various arguments regarding the issue rather than their personal identification to the individual originating the message. Gouran acknowledges this "relational influence," noting that the receiver will respond to a comment from a group member who is a close friend differently than if the same comment were made by a rude or hostile group member (1994:34). Once again, the anonymity feature of the GDSS is expected to mitigate the "extreme influence of high-status members" (Er and Ng, 1995:78).

Unfortunately, there is no empirical research that directly addresses this kind of influence. Perhaps the most applicable study was conducted by Dubrovsky, Kiesler, and

Sethna. The researchers compared N-GDSS and GDSS groups to examine status

equalization in a computer-mediated environment (1991:138). Mixed-status groups were

formed when one graduate student (*high-status*) was joined with three freshmen students

(*low-status*). Using a 2x2 factorial design, groups discussed two topics. One topic

favored discussion by the high-status member while the other topic favored discussion by

low-status members. Discussion occurred in either a N-GDSS or GDSS environment.

Groups using a GDSS communicated only by electronic means. Computer-mediated

communication tended to reduce the participation advantage of group members when the

task favored more discussion from them (1991:135). Furthermore, the study indicated

that the impact of external status was reduced when groups used electronic

communication (1991:138). "Status," as defined in this study, is a compilation of many

external indicators between group members—such as "race, gender, age, physical

attractiveness, or organizational position" (1991:121). In addition to this study, field

research by Sproull and Kiesler indicated that social differences are less discernible when

people communicate electronically, while communication across organizational structures

and social boundaries is greater (1986:1492). It is important to note that this variable

differs from referent influence, which does not include organizational position or expertise.

Nevertheless, due to the absence of social cues when using electronic communication,

GDSS technology should mitigate the effect of referent influence between group members.

> *Hypothesis 3:*   Group members using GDSS technology perceive less
> referent influence than N-GDSS group members.

Reward and Coercive Influence.

The two influence methods of "rewards" and "coercion" can generally be considered "different sides of the same coin." In one case, a person can offer rewards such as valued resources, recognition, or approval to influence others. Conversely, the threat of coercive acts such as withholding or removing resources, humiliation, or disapproval can also be used to influence other group members. These two influence modes are often referred to together as "sanctions." While coercive influence will decrease the attraction between the sender and receiver, reward influence will increase it (French and Raven, 1959:158).

Once again, the anonymity feature of GDSS communication is assumed to mitigate the effect of reward and coercive influence, since it is considered to "detach ideas from their proponents" (Lim, Raman, and Wei, 1994:202). Er and Ng argue that, with the assurance of anonymity, group members will feel safe enough to express "unpopular, novel or heretical opinions without fear of hostility" (1995:78). They also assert that, in a GDSS environment, "criticism is addressed at an idea, not a person" (1995:78). Thus, group members should be less aware of coercive influence in a GDSS environment. However, reward influence should also be mitigated in a GDSS setting. The same process that should reduce coercion will also reduce rewards. One could argue that "praise" is also addressed at an idea, not a person—and that group members will not be duly recognized for helpful ideas that are especially novel and insightful. How can someone be personally rewarded when participation is anonymous? Of course, in actual groups that use verbal communication in addition to the GDSS, some reward and coercive influence

31

may be evident. However, since the shield of anonymity is believed to separate message from sender, these influence modes should be significantly reduced in a GDSS setting.

>*Hypothesis 4:* Group members using GDSS technology perceive less reward and coercive influence than N-GDSS groups.

Opportunity to Influence.

As goes the proverb "two heads are better than one," so goes conventional wisdom in group dynamics. The more group members who provide input, the more likely that problems are identified and solutions are examined by the team—resulting in "more effective and creative decisions" (Falk and Falk, 1981:211). Providing group members with equal access to the communication medium while decreasing social influence modes which may hamper insightful input is the ultimate goal of a GDSS. DeSanctis and Gallupe argue that each member's perceived power—the kinetic ability to influence others—will become more distributed when using a GDSS, resulting in better decisions (1988:605). Lim, Raman, and Wei suggest that the equal access to the communication medium afforded to group members using GDSS technology will have a "significant implication with respect to power and influence in groups" (1994:201). This would result since group members using GDSS technology are not subjected to a "lack of speaking time" and inability to immediately "verbalize their ideas" as are members in a N-GDSS group (Valacich, Dennis, and Connolly, 1994:451). Therefore, it is assumed that members in GDSS groups will perceive a more equal opportunity to influence others since they are able to consider more opinions and have equal access to the communication medium.

The empirical evidence suggests that GDSS technology does, in fact, provide members with a greater perceived opportunity to influence others. Scott and Easton

conducted a study to determine if GDSS technology did, in fact, equalize influence attempts by group members. They concluded that group members who were considered highly-influential before a GDSS meeting were still perceived as highly influential during the meeting, and that less-influential members were still perceived as less influential (1996:372). The Scott and Easton study is important since it indicated that using a GDSS does result in some "equalization" of influence. Highly-influential members were perceived as somewhat less influential while less-influential members were considered somewhat more influential (1996:373). While the perceived influence between high- and low-influential members was not statistically equal, "individuals do perceive fewer differences between group members in terms of influence" following GDSS interaction (1996:374).

The study by Lim, Raman, and Wei also indicates that there is an equalization in the opportunity to influence others. When comparing influence attempts between N-GDSS and GDSS groups, they concluded that groups supported by GDSS technology produce a greater amount of influence behavior than did N-GDSS groups (1994:207). These researchers also concluded that influence inequality is lower in GDSS groups than N-GDSS groups (1994:206). Similarly, the Dubrovsky, Kiesler, and Sethna study noted that in N-GDSS groups one person may talk for 45% of the time, whereas the participation is more equally-distributed when the same group communicates entirely through an electronic medium (1991:125), an assertion confirmed by Valacich, Dennis, and Connolly (1994:463). These studies, too, indicate that when groups use GDSS technology, members seem to be more aware of their opportunity to influence others than do N-GDSS groups which may be influenced by a few dominant members. Even though

33

GDSS groups in this project were able to communicate verbally, the electronic medium

should result in the perception that each member has a greater opportunity to influence

others than do N-GDSS groups.

> *Hypothesis 5:*   Group members using GDSS technology perceive a greater
> opportunity to influence others than members in N-GDSS
> groups.

Study Expectations.

Based on the review of relevant literature presented above and the corresponding

hypotheses regarding the various influence modes, the medium of communication should

have a significant effect on the perceived influence modes of group members. While N-

GDSS groups will serve as a baseline in this study, it is expected that group members

using GDSS technology will significantly perceive a greater amount of expert influence

and a more equal opportunity to influence others. In addition, perceived referent, reward,

and coercive influence should be diminished. There should be no significant difference in

the amount of perceived influence from legitimate authority as reported by group

members. The diagram below indicates the expected relationship between GDSS

technology and influence modes as compared to N-GDSS groups.
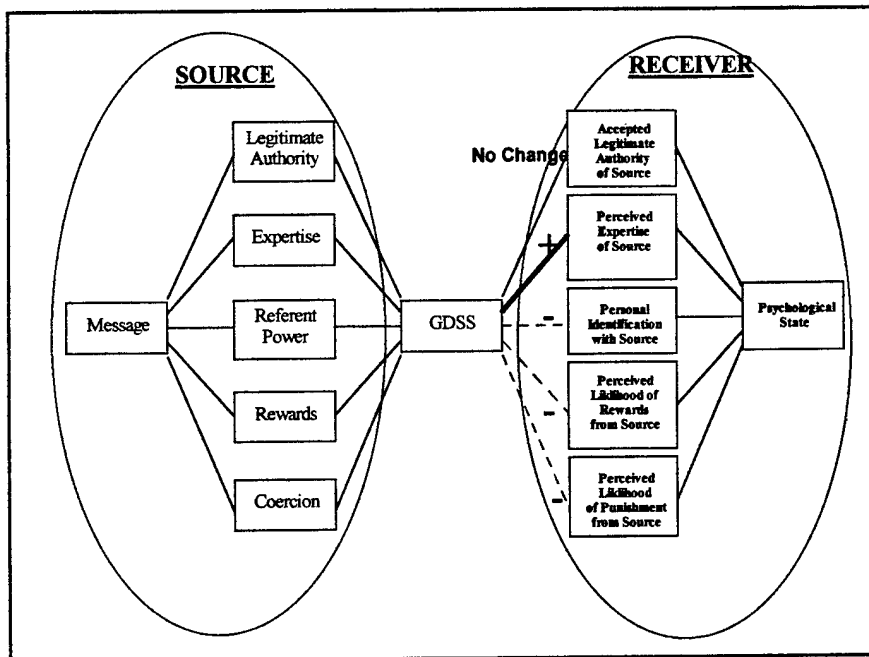
Figure 4. Expected Effect of GDSS Technology upon Group Influence

Focus of This Research

Although many studies have examined the impact of GDSS technology on various

influence modes in an experimental setting, this research examines the five influence

sources in the field. This section addresses many of these shortcomings and establishes a

foundation for the methodology used in this study, which is described in the following

chapter.

Virtually all of the studies described above were conducted in a laboratory

environment. These studies are important since they reveal precise nuances of using

electronic communication; however, laboratory results may not be replicated in a field

setting. This may result due to effects of organizational contexts such as formalized work

structures (Saunders, Robey, and Vaverek, 1994:445).

Researchers often argue for the study of actual work groups rather than ad hoc groups. Kraemer and King note that "current research is biased in the direction of ad hoc rather than continuing users" (1988:140). Researchers complain that findings resulting from studies of ad hoc groups, such as collegiate students who have no prior relationships and who work together on unfamiliar tasks, cannot be generalized to actual work groups (Saunders, Robey, and Vaverek, 1994:445, Scott and Easton, 1996:378). Motivation of group members may also be low, since they have no stake in the outcome of their decisions. As Scott and Easton point-out, "Designs that allow groups to work on their own task would provide the necessary motivation" (1996:378).

Other complaints regarding the laboratory studies was the fact that experimental restrictions do not reflect actual use of GDSS technology in a field setting. Unlike the GDSS facilities used in this project, group members were purposely separated and discouraged from communicating verbally. As discussed previously, actual groups often use GDSS technology to supplement group communication. Communication via computer is often not the sole communication medium.

Regarding the study of influence specifically, Scott and Easton recognize that "influence as we have defined it seems difficult to assess in zero-history groups" (1996:363). Spears and Lea stipulate that actual "power relations are often relatively long lasting, stable, and have material consequences for those involved," aspects which are not replicated in ad hoc groups (1994:424). Furthermore, laboratory studies try to duplicate organizational power relations by quickly electing a group leader or by arbitrarily assigning a leader—attempts which pale in comparison to actual legitimate authority bestowed to an individual in an organizational setting (Lim, Raman, and Wei, 1994:202).

Actual work groups were preferred for this research project to overcome the limitations described above.

Summary

This chapter examined the theoretical framework for the study by thoroughly detailing the influence process and operational definitions therein. The influence process plays an important part in group dynamics, and the use of influence has a direct impact on the effectiveness of a group's decision. Various characteristics, such as legitimate authority, expertise, and referent power often delineate influential group members. GDSS technology is expected to enhance expert influence, have no effect on influence derived from legitimate authority, while mitigating referent, reward, and coercive influence. In addition, group members should perceive a more equal opportunity to influence other group members in GDSS meetings than they do in FtF meetings. While ad hoc groups have been used primarily in prior studies regarding GDSS influence effects, this study will use actual work groups to avoid limitations of previous research. The methodology describing this study will be addressed in the following chapter.

3. Methodology

Introduction

As discussed in the previous chapter, GDSS technology is expected to significantly impact group dynamics. The GDSS feature of anonymity is considered to reduce the effect of several influence modes, as well as the perceived opportunity to influence other group members. Even though single influence modes such as legitimate authority and expertise have been examined by previous studies, researchers have failed to examine how GDSS technology impacts the entire scope of influence methods, such as the five influence sources defined by French and Raven. This chapter discusses the methodology used to obtain information in order to measure these influence modes and the perceived opportunity to influence. Information regarding the research design, survey instrument, sampling procedures, and analytical methods are detailed in this chapter.

Research Design

The focus of this study centered around obtaining pertinent information that enabled the researcher to make a sound comparison of dependent variables in N-GDSS and GDSS groups. To ensure the information obtained was as accurate as possible, which directly affected the accuracy and validity of the project's conclusions, a research strategy was devised. Furthermore, a systematic sample of the applicable population was selected, ensuring reliability of the study.

The research strategy was devised to ensure a high degree of validity and reliability during the study. Information was gained that was directly pertinent to the research questions involved, which was to compare the scores of perceived influence modes and opportunity to influence others in N-GDSS group meetings and those using GDSS technology. Therefore, the method of study focused wholly on obtaining reports of perceived influence modes, perceived opportunity to influence others, and some general demographic information.

Measurement of Variables

Information regarding the dependent variables of this study was obtained via a survey questionnaire, as opposed to direct observation or an experiment. The reasons for choosing this instrument over other research instruments are presented later in this chapter. The research method consisted of several basic steps:

1) obtaining permission to conduct the study,

2) developing a survey questionnaire,

3) selecting subjects from the applicable population,

4) gathering survey results, and

5) performing statistical analysis of the final information.

Population and Sample.

GDSS technology is used at various locations within the Air Force, the Department of Defense, and the federal government. Air Force leaders and managers who have knowledge of and access to these GDSS facilities may choose to use them when group discussion is necessary rather than meeting in a N-GDSS setting. Prospective users

are limited only by fiscal restraints (if a facilitator must be contracted) and the availability of the GDSS facility (conflicts with other groups or the occurrence of technical problems and/or maintenance). Therefore, Air Force groups may choose to utilize GDSS facilities whenever it is appropriate and available. The same reasoning, of course, applies to groups who meet in a N-GDSS setting. The size of this population is difficult to estimate, since the decision to meet in a group setting depends on the leader or manager. This study based its conclusions on the survey responses of several groups who met in a N-GDSS or GDSS setting over a three-month period, from 15 August 1997 to 15 November 1997. Actual Air Force groups were examined in this study. Due to the limitations of the study, which will be discussed in Chapter 5, a convenience sample was used to gather results from both treatment groups.

The Survey Instrument

Primary information for this study was gathered via a survey instrument. It was used to gather data regarding perceived influence modes upon a group member and the opportunity of group members to influence others. As alluded to previously, the survey was the logical instrument required to obtain primary data for this study as opposed to other instruments.

Measurement of Dependent Variables.

Unlike previous studies that attempted to observe influence by identifying influence attempts (Dubrovsky, Kiesler, and Sethna, 1991; Lim, Raman, and Wei, 1994), the current research attempted to measure which modes were effective in influencing the individual group member. This distinction is important. Although a group member may exhibit

40

more "influence attempts," previous studies assume that these attempts actually influence other group members. This is not necessarily the case. An individual group member could be influenced by a single comment that they perceive as exceptionally insightful or as a legitimate request from one person despite the number of influence attempts that are made from others. In addition, individuals may perceive the same influence attempt differently. Gouran describes this aspect of influence:

> ...most of us probably can recall instances in which we have responded to the input of a group member in a way that is quite different from how we would have responded to someone else who might have said exactly the same thing. In these situations, whether we are aware of it or not, it is the relationship that is driving the interaction. (Gouran, 1994:35)

Such personal responses can't be categorized by using experimental or observatory techniques. These perceptions can only be assessed by allowing each individual to identify the most effective influence mode in a meeting. Therefore, the personal perceptions of group members were measured via survey as done in other studies regarding influence (Ivancevich and Donnelly, 1970; Scott and Easton, 1996; Student, 1968).

Dependent variables (influence modes and influence opportunity) were measured via a survey constructed by the researcher. As done in previous studies regarding these variables (see Ivancevich and Donnelly, 1970; Student, 1968), a likert-type scale was used to quantify a group member's perceived presence of these variables. Respondents indicated how important they believed various influence modes were in influencing them during the meeting (1 = not important; 5 = very important). Fifteen questions were used to measure these five variables. Each variable was measured three times using similar questions. In addition, the "influence opportunity" variable was also measured by answering questions using a likert-scale. For these questions, respondents indicated their

agreement regarding the equality of influence opportunity during the meeting (1 = strongly

disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree).

Approval was gained from the Air Force Personnel Center Survey Branch (HQ

AFPC/DPSAS) on 24 July 1997. The final survey is presented in Appendix A.

This survey instrument was refined on through pilot testing. The pilot tests were

conducted using N-GDSS groups at Wright-Patterson Air Force Base (WPAFB). Results

of the first pilot test revealed weaknesses with the survey, which was re-worded in

accordance with suggestions by respondents. A second pilot test using the revised survey

indicated that inter-item correlations were substantial (survey data from this pilot test is

found at Appendix D). Cronbach's Alpha, which measures the degree to which questions

obtain consistent results (Cooper and Emory, 1995:154), was used to determine the

internal consistency of questions regarding a specific influence mode. Cronbach's Alpha

for questions measuring each dependent variable in this study are shown below in Table 1,

(SPSS data for each variable is found in Appendices E-J, showing reliability analyses):

Table 1. Cronbach's Alpha of Dependent Variables

Expert Influence	**.8800**
Legitimate Authority	**.7171**
Referent Influence	**.8009**
Rewards	**.8685**
Coercion	**.8333**
Equal Influence Opportunity	**.7552**

The research questions, presented in Chapter 1 of this study, lent themselves to the examination of two aspects regarding GDSS technology and influence modes. The researcher derived five testable hypotheses based upon these research questions and the results of previous studies, as presented in the review of literature found in Chapter 2. Each research question is presented below, followed by discussion of the variables measured.

The first research question was as follows: "Does GDSS technology enhance or mitigate different perceived social influence sources as opposed to a N-GDSS setting?" The two independent variables in this question are the group treatments—N-GDSS or GDSS. The survey measured the perceived presence of the five influence sources described earlier (expertise, legitimate authority, referent, reward, coercion). Questions addressing these variables were taken directly from the operational definitions of each influence mode. The high inter-item correlations for each series of questions validated the ability of the instrument to measure these variables.

The second research question stated: "Does GDSS technology affect group members' perceived 'opportunity to influence' other members as opposed to N-GDSS groups?" Again, the N-GDSS or GDSS treatments comprised the two independent variables. The dependent variable was each group member's perceived equality of influence opportunity. Questions regarding this variable consisted of the degree to which members agreed that comments were completely discussed, members had equal opportunities to make influence attempts, and more group members influenced him. These questions were derived from the variable's operational definition, and had a high inter-item correlation (shown above).

Sampling Method and Procedures

N-GDSS groups located at WPAFB and the Pentagon were examined. These locations were used due to availability and to the limitations of time and distance, which will be discussed in Chapter 5. After obtaining the addresses and locations of Air Force units at the Pentagon and on WPAFB, the researcher selected 30 work groups to participate in the study. Of these offices, 9 groups agreed to participate, yielding a total of 74 usable survey results from this N-GDSS treatment.

GDSS groups examined in this study were also from WPAFB, the Pentagon, and the Defense Information Systems Agency (DISA) in Falls Church, VA. Since GDSS technology was infrequently used by groups at these sites, the researcher was not able to randomly select these groups. Instead, the researcher administered the survey to every group in these locations who used GDSS technology when conducting a meeting. Nine groups participated in the study, yielding 69 usable surveys.

Permission to administer the surveys to groups was obtained by the various organizations who conducted group meetings. Since actual meetings were used, the purpose of the meetings varied greatly. The only requirement of participating groups was that at least one collaborative task was performed. Tasks performed must be judgmental (vice intellective) in nature, and may consist of brainstorming, problem-solving, planning, or goal-setting. The researcher either directly observed these meetings or questioned group leaders to ensure a suitable task was performed. In this way the researcher ensured that all groups participated in the collaborative group performance required for the purposes of the study. In addition, this methodology attempted to overcome a common shortcoming noted in experimental studies caused by low task acceptance and involvement

by individual members in ad hoc groups. Groups in this study performed an organizational task rather than a contrived task of the researcher's own choosing.

In nearly all cases, surveys were administered and returned immediately following the group meeting. However, in three cases, surveys were administered several days after the meeting which was measured. In these cases, respondents were reminded of the specific meeting and asked to recall only their perceptions of that meeting.

Analytical Methods

For the purpose of this study, statistical analysis methods were used to derive conclusions from the information gathered by the survey. Descriptive statistics, a comparison of variable mean scores, were examined to identify any trends in the data. In addition, a quantitative analysis was performed. Recalling the six hypotheses set forth in Chapter 2 following a review of relevant literature, results for five of these were measured using a one-tailed test for significance of mean values. This test was used to determine if, as suggested by the review of literature, GDSS technology used by Air Force groups significantly increases expert influence and perceived influence opportunity for group members when compared to N-GDSS groups, shown in Figure 5:

$$H_0: \left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}} \right) = 0$$

$$H_{A\ (Expertise)}: \left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}} \right) \langle 0$$

$$Test\ Statistic:\ z = \frac{\left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}} \right) - 0}{\sigma_{\left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}} \right)}}$$

$$Rejection\ Region:\ z \langle -z_{\alpha}$$

Figure 5. One-Tailed T-Test; Expertise Variable

Furthermore, this same test was utilized to conclude if referent, reward, and coercive influence was mitigated by GDSS technology as reported by Air Force groups in relation to N-GDSS groups. Since less influence was hypothesized in these cases, the rejection region for this analysis differs than that shown above:

$$H_0: \left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}} \right) = 0$$

$$H_{A\ (Referent,\ Reward,\ Coercion)}: \left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}} \right) \rangle 0$$

$$Test\ Statistic:\ z = \frac{\left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}} \right) - 0}{\sigma_{\left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}} \right)}}$$

$$Rejection\ Region:\ z \rangle z_{\alpha}$$

Figure 6. One-Tailed T-Test; Referent, Reward, and Coercion

A two-tailed test of mean value significance was employed regarding the perceived influence of legitimate authority, since it was hypothesized that no significant difference would exist between N-GDSS and GDSS groups. Equations regarding the two-tailed test for significance are shown in Figure 7 below:

$$H_0: \left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}}\right) = 0$$

$$H_{A\ (Legitimate\ Auth)}: \left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}}\right) \neq 0$$

$$Test\ Statistic:\ z = \frac{\left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}}\right) - 0}{\sigma_{\left(\mu_{\text{n-gdss}} - \mu_{\text{gdss}}\right)}}$$

$$Rejection\ Region:\ z \langle -z_{\alpha/2}\ \ or\ \ z \rangle z_{\alpha/2}$$

Figure 7. Two-Tailed T-Test; Legitimate Authority

The statistical methods presented above allowed the researcher to make conclusions regarding the difference between treatment means. Results of this analysis was used to address the study's research questions in Chapter 5.

Summary

This chapter described the researcher's methodology in this study. A survey instrument was employed to gather necessary information regarding the specific dependent and independent variables, and appropriate statistical methods were selected to provide the analysis required to answer the research questions. The following chapter presents the results and findings of these statistical analyses.

4. Results

Introduction

In the previous chapter, the researcher presented the two methods of statistical analysis used in this study: the one-tailed and two-tailed test for significance of mean values (i.e., t-test). Furthermore, the researcher explained why these statistical techniques were the appropriate methods to analyze the hypotheses which support the study's research questions. This chapter presents details regarding data-gathering efforts of GDSS and N-GDSS groups. Also, after statistical analysis was performed, the findings of each hypothesis question are presented.

Results and Findings

Two steps were necessary to draw conclusions concerning the study's research questions. First of all, information was collected regarding the influence modes and the opportunity to influence others via samples from the population. Secondly, statistical analysis of the dependent variables was performed. The results of the data-gathering process and the findings resulting from statistical analysis are presented below.

Data Gathering.

Surveys were administered to both GDSS and N-GDSS groups from August to November, 1997. In most cases, respondents answered the survey immediately following the meeting in question. Respondents in three GDSS meetings, however, completed the

survey approximately one week after the GDSS session. In these cases, members were reminded of the meeting before answering the survey. The survey was answered by a total of 9 N-GDSS groups, rendering 74 usable surveys. For the GDSS treatment, a total of 9 groups completed the survey, rendering 69 usable surveys for analysis. Since groups in both treatments completed identical surveys, the surveys were color-coded and numbered prior to administration to ensure data was attributed to the correct treatment sample.

Answered surveys were collected by the researcher immediately following completion. In the event that surveys were administered by a proctor, which was often the case for groups in the GDSS treatment, the surveys were immediately mailed to the researcher for analysis. There were no problems encountered while collecting data from the survey tool.

Upon collecting the answered surveys, information concerning subjects (i.e., demographic characteristics, treatment group, and question responses) was entered into a personal computer using MicroSoft Excel, version 7.0. Mean scores of each variable were calculated. These scores were initially examined to identify any trends between the two treatments. To perform statistical testing, the researcher used the Data Analysis Tool of the Excel software—results of which are included in this chapter. The researcher used all 74 N-GDSS responses, as well as al 69 GDSS responses when performing the statistical analysis. The primary data for respondents in the N-GDSS treatment can be found in Appendix B, while the data of GDSS respondents is presented in Appendix C.

<u>**Statistical Analysis.**</u>

The statistical analysis process was performed in accordance with the methodology presented in Chapter 3 of this study. After examining the data for trends, all hypotheses set forth previously were tested for significance at the 0.05% alpha level. This significance level, which was generally used in other studies relevant to this research, was sufficient for this study. The research questions addressed in this study are presented below, followed by the supporting hypotheses and their findings.

<u>**Descriptive Statistics: Data Trends.**</u>

Before performing hypothesis testing of means, the researcher examined the data to identify trends. Comparing the mean scores of all influence modes examined in this research indicated that the patterns of influence modes are similar between the treatments. Both groups perceived expert influence most, followed next by referent influence and then influence resulting from legitimate authority. Reward and coercion were the least-perceived of the influence sources in the study. Figure 8 below displays these results, comparing the means of each dependent variable studied during this research project.
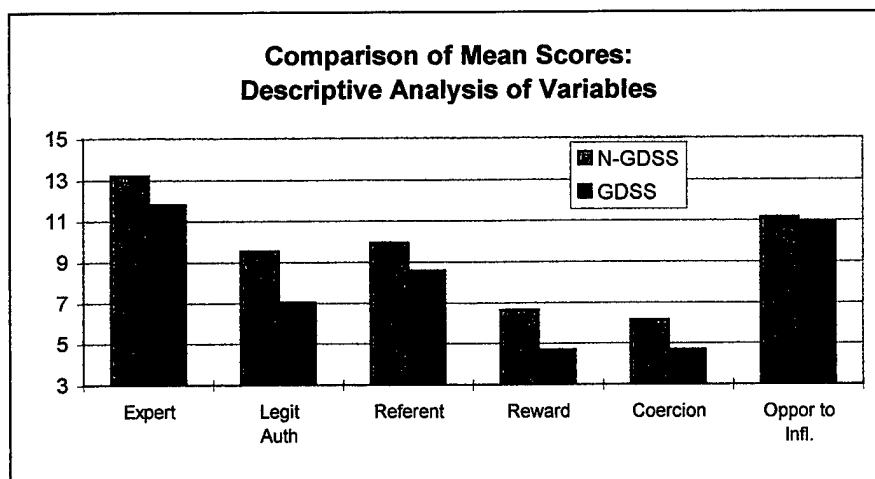
Figure 8. Descriptive Comparison of Variable Means

Influence Sources.

The first research question in this study asked: "Does GDSS technology enhance or mitigate different perceived social influence sources as opposed to a N-GDSS setting?" Five hypotheses were derived in support of this research question, which originated from the five influence sources presented in Chapter 2.

Expert Influence.

The first hypothesis presented in support of the above research question examined expert influence. This hypothesis is stated below:

> Group members using GDSS technology perceive more expert influence than members in N-GDSS groups.

Each respondent's perceived expert influence was obtained from three survey questions (the 6th, 11th, and 16th questions on the survey tool). Respondent's scores on these questions were then compiled to obtain a score that represented their perception of expert influence during the meeting. A mean "expertise influence" score was calculated from the respondents' scores. These mean scores are presented in Figure 9 below.

Comparison of Mean Scores: Expert Influence

N-GDSS: 13.19
GDSS: 11.77
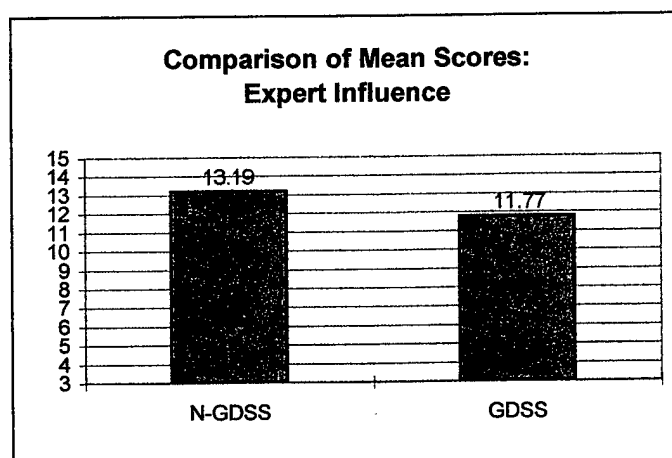
Figure 9. Comparison of Expert Mean Scores

This information was further analyzed statistically using a one-tailed t-test. As this analysis indicates, the researcher's hypothesis was not supported—group members using GDSS technology in an actual environment did not perceive more expert influence than members in the N-GDSS treatment. In fact, members in the GDSS treatment perceived significantly less expert influence than members in the N-GDSS treatment (T = 2.9, p < .05, one-tailed t-test, see Table 2).

Table 2. Results of Statistical Analysis: Expert Influence

Hypothesis: Expert Influence		
	N-GDSS	GDSS
Mean	13.19	11.77
Variance	5.72	11.62
Observations	74	69
Pooled Variance	8.56	
Hypothesized Mean Difference	0	
df	141	
t Stat	2.90	
P(T<=t) one-tail	2.15E-03	
t Critical one-tail	1.66	
P(T<=t) two-tail	4.31E-03	
t Critical two-tail	1.98	

Influence from Legitimate Authority.

The second hypothesis examined influence based upon legitimate authority. The hypothesis presented in support of the research question stated:

> There is no difference between groups using GDSS technology and
> N-GDSS communication regarding the perceived influence of legitimate
> authority.

Mean scores for each treatment were obtained in a manner similar to that presented for the previous hypothesis. Respondent's scores regarding perceived influence from legitimate

authority were calculated from answers to the 7th, 12th, and 17th questions from the survey.

The mean scores from each treatment are presented below in Figure 10.
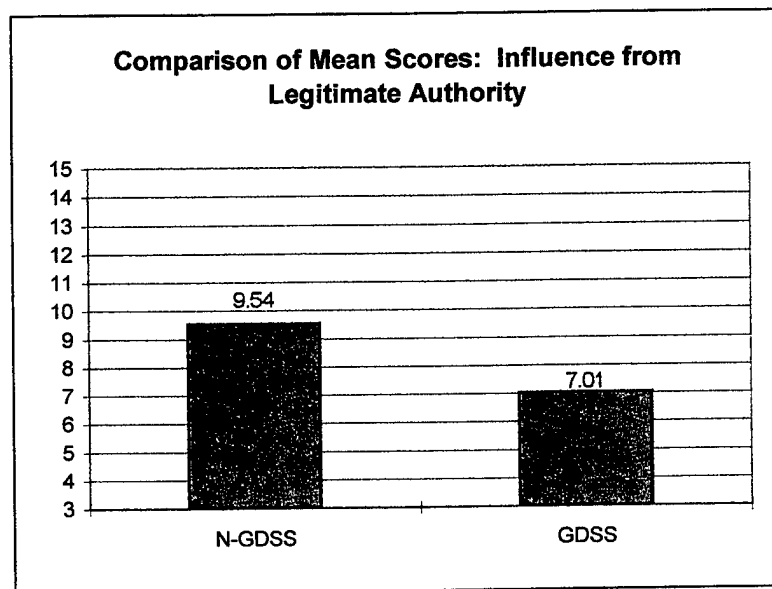
Figure 10. Comparison of Legitimate Authority Mean Scores

Since no significant difference was anticipated between mean scores, a two-tailed t-test

was used to analyze this data. Statistical analysis failed to support the researcher's

hypothesis. This analysis indicated that members in the GDSS treatment experienced

significantly less influence from legitimate authority than members in the N-GDSS

treatment (T = 5.19, p < .05, two-tailed t-test, see Table 3).

Table 3. Results of Statistical Analysis: Influence from Legitimate Authority

Hypothesis: Influence from Legitimate Authority		
	N-GDSS	GDSS
Mean	9.54	7.01
Variance	6.25	10.81
Observations	74	69
Pooled Variance	8.45	
Hypothesized Mean Difference	0	
df	141	
t Stat	5.19	
P(T<=t) one-tail	3.55E-07	
t Critical one-tail	1.66	
P(T<=t) two-tail	7.10E-07	
t Critical two-tail	1.98	

Referent Influence.

The third source of influence is "referent influence." This kind of influence was examined in the third hypothesis, which stated:

Group members using GDSS technology perceive less referent influence than members in N-GDSS groups.

Referent influence was measured after responses to the 8th, 13th, and 18th survey questions were added together for each respondent. The perceived referent influence was represented in a mean score for each treatment, which is shown in Figure 11 below.
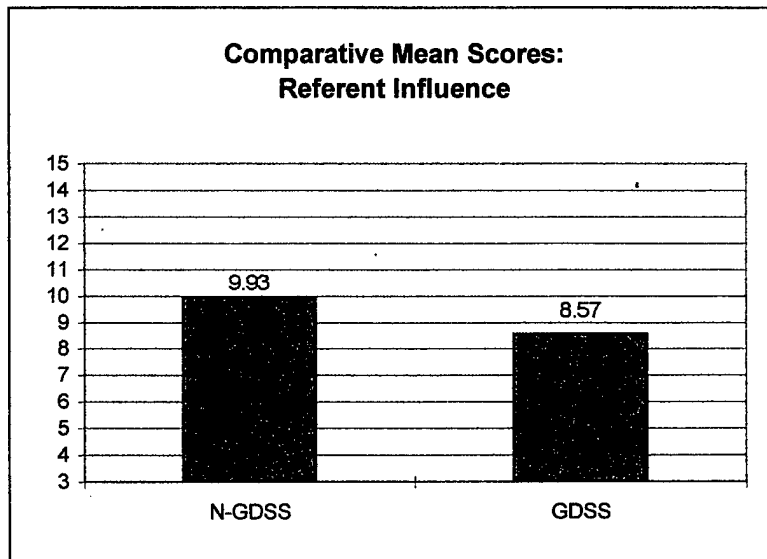
Figure 11. Comparison of Referent Influence Mean Scores

It was anticipated that the anonymity feature of input in GDSS meetings would reduce the amount of referent influence perceived by group members when compared to members in the N-GDSS treatment. After statistical analysis using a one-tailed t-test, this hypothesis was supported. GDSS members perceived significantly less referent influence than N-GDSS members (T = 2.7, p < .05, one-tailed t-test, see Table 4).

Table 4. Results of Statistical Analysis: Referent Influence

Hypothesis: Referent Influence		
	N-GDSS	*GDSS*
Mean	9.93	8.57
Variance	8.45	9.40
Observations	74	69
Pooled Variance	8.91	
Hypothesized Mean Difference	0	
df	141	
t Stat	2.74	
P(T<=t) one-tail	3.49E-03	
t Critical one-tail	1.66	
P(T<=t) two-tail	6.98E-03	
t Critical two-tail	1.98	

Reward and Coercive Influence.

The fourth and fifth sources of influence examined in support of the first research question is reward and coercive influence. The hypothesis regarding these influence sources stated:

> Group members using GDSS technology perceive less reward and coercive influence than members in N-GDSS groups.

Reward influence perceived by each respondent was determined by summing the 9th, 14th, and 19th questions from the survey instrument. Mean scores for each treatment were calculated, and are shown graphically in Figure 12 below.
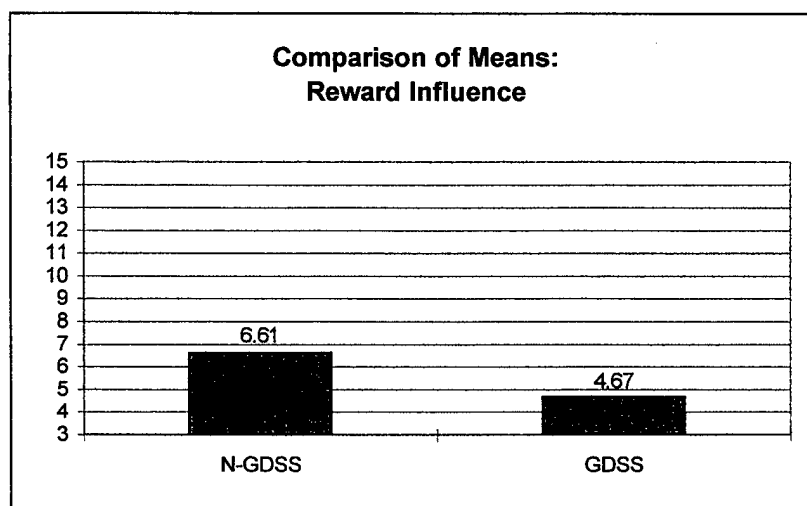
Figure 12. Comparison of Reward Influence Mean Scores

Results of a one-tailed t-test indicated support for the hypothesis above. Members in the GDSS treatment perceived significantly less reward influence than members in the N-GDSS treatment (T = 4.25, p < .05, one-tailed t-test). Results of this statistical analysis are presented in Table 5 below.

Table 5. Results of Statistical Analysis: Reward Influence

Hypothesis: Reward Influence		
	N-GDSS	*GDSS*
Mean	6.61	4.67
Variance	7.72	7.11
Observations	74	69
Pooled Variance	7.43	
Hypothesized Mean Difference	0	
df	141	
t Stat	4.26	
P(T<=t) one-tail	1.88E-05	
t Critical one-tail	1.66	
P(T<=t) two-tail	3.75E-05	
t Critical two-tail	1.98	

Perceived coercive influence was determined by summing the 10th, 15th, and 20th questions from survey responses. As with reward influence, the N-GDSS mean score for coercive influence surpassed the mean score in the GDSS treatment (shown below).

Comparison of Means: Coercive Influence
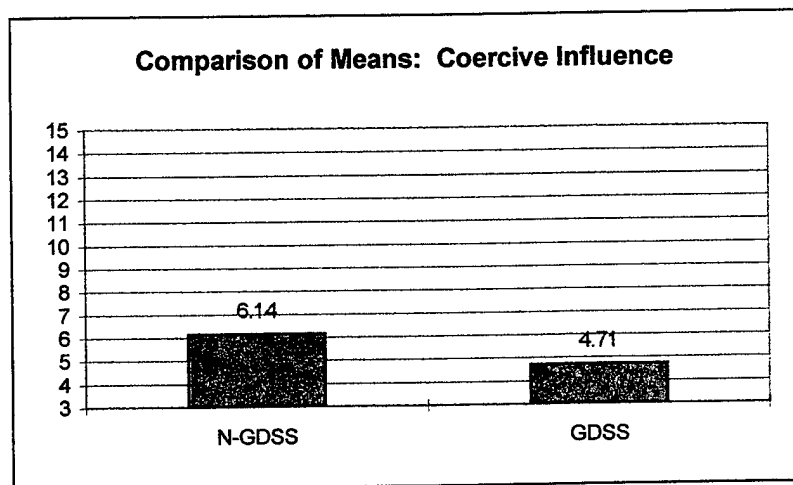
Figure 13. Comparison of Coercive Influence Mean Scores

Like reward influence, a one-tailed t-test was employed to statistically analyze the difference in mean scores between these two treatment groups. Results of this analysis indicated that significantly less coercive influence is perceived by members in the GDSS treatment (T = 3.6, p < .05, one-tailed t-test, see Table 6).

Table 6. Results of Statistical Analysis: Coercive Influence

Hypothesis: Coercive Influence		
	N-GDSS	GDSS
Mean	6.14	4.71
Variance	5.68	5.43
Observations	73	68
Pooled Variance	5.56	
Hypothesized Mean Difference	0	
df	139	
t Stat	3.60	
P(T<=t) one-tail	2.20E-04	
t Critical one-tail	1.66	
P(T<=t) two-tail	4.40E-04	
t Critical two-tail	1.98	

57

The results of these two t-tests, taken together, support the fourth hypothesis—that

members in the GDSS treatment perceive significantly less reward and coercive influence

than those in the N-GDSS treatment.

Opportunity to Influence.

The second research question asked in this study stated: "Does GDSS technology

affect group members' perceived 'opportunity to influence' other members as opposed to

N-GDSS groups?" One hypothesis question was investigated in support of this research

question. This hypothesis asserted:

> Group members using GDSS technology perceive a greater opportunity to
> influence others than do N-GDSS group members.

The same technique used to measure previous variables was used in this instance as well.

Perceived opportunity to influence others was measured by compiling answers to the

survey's 21st, 22nd, and 23rd questions. Mean scores for both the GDSS and the N-GDSS

treatment were calculated and are presented in Figure 14 below.

**Comparison of Means:
Opportunity to Influence**

N-GDSS: 11.14   GDSS: 10.94
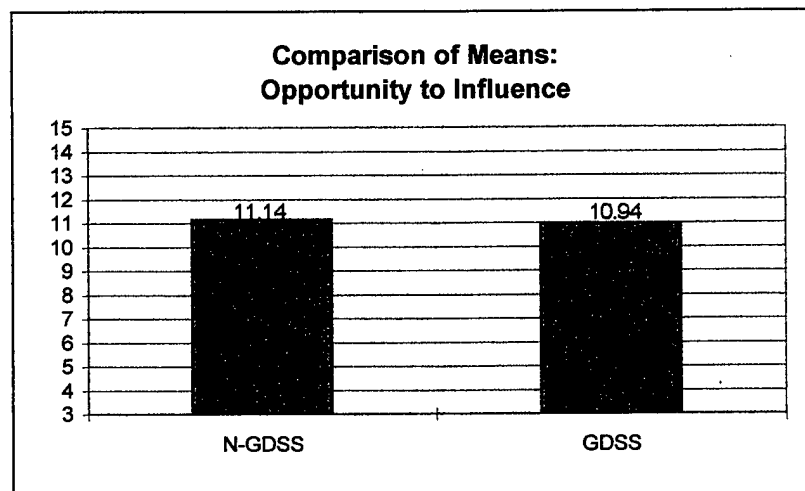
Figure 14. Comparison of "Opportunity to Influence" Mean Scores

Since the ability for more group members to have access to the communication medium in a GDSS mediated group, a greater opportunity to influence others was hypothesized for GDSS group members. To test this hypothesis, a one-tailed t-test was employed. Results of this statistical analysis did not support the hypothesis; indicating that no significant difference existed between treatments regarding the perceived opportunity to influence others (T = .48, p > .05, one-tailed t-test, see Table 7).

Table 7. Results of Statistical Analysis: Opportunity to Influence

Opportunity to Iinfluence Hypothesis		
	N-GDSS	GDSS
Mean	11.14	10.94
Variance	5.84	5.26
Observations	74	69
Pooled Variance	5.56	
Hypothesized Mean Difference	0	
df	141	
t Stat	0.49	
P(T<=t) one-tail	3.13E-01	
t Critical one-tail	1.66	
P(T<=t) two-tail	6.25E-01	
t Critical two-tail	1.98	

Summary

The information presented in this chapter revealed the results of the data-gathering process and findings of the statistical analysis performed when testing research question hypotheses. The researcher experienced no difficulties obtaining the necessary information used in the statistical analysis. Analysis revealed that N-GDSS group members perceived significantly greater levels of each influence source (expert, legitimate authority, referent, reward, and coercion) than GDSS group members perceived. Results of statistical analysis indicated that no significant differences existed between treatment

groups in regards to perceived opportunity to influence others. The following chapter

presents the researcher's discussion and conclusions regarding the research topic drawn

from these results and findings.

5. Discussion

Introduction

The previous chapter revealed the results of the researcher's data-gathering efforts as well as findings of test hypotheses from statistical analysis. These efforts provided a basis for the researcher's conclusions in this chapter. Conclusions were not only examined in regard to the facts revealed in the literature review, but were also examined concerning the effects of limitations upon the study. In addition, recommendations for managers were presented concerning GDSS use in light of conclusions to the research questions.

Discussion: Analysis and Literature Review

The results of this research varied somewhat from the researcher's expectations. The expectation that use of GDSS technology in an environment would enhance certain influence modes while impeding others was not indicated from the results. The statistical analysis revealed that the use of GDSS technology appeared to mitigate all influence sources when compared to N-GDSS groups. These findings should be examined with regard to the literature review conducted in Chapter 2.

The results of this descriptive comparison indicated that GDSS technology, even when used in a FtF setting where group members can also communicate verbally, effectively impedes all five social influence modes when compared to groups in a N-GDSS environment. Descriptive analysis showed that group members using a GDSS perceived

influence in the same manner as N-GDSS group members. In both treatments, expert influence was the most-perceived influence mode followed by referent influence and legitimate authority, while reward and coercive influence were perceived least (GDSS group members perceived roughly the same amount of reward and coercive influence). While member influence tends to be "equalized" among group members using GDSS technology (Scott and Easton, 1996:373), this study finds that all of the perceived influence modes are reduced (significantly, as shown by means testing) in GDSS groups.

Expert influence was not enhanced by the use of GDSS technology. These findings indirectly confirmed the research by Hollingshead, which indicated that the use of GDSS technology, in an experimental environment, tended to suppress critical or "expert" information (1996:210). Even though Hollingshead's study did not examine what influence mode group members perceived, the parallels between the "critical information" Hollingshead used and the perception of expert influence may be stronger than first anticipated. Unlike the groups used by Hollingshead, GDSS groups in this study were able to communicate verbally in addition to using the computer medium. It was supposed that this additional FtF interaction would minimize the information suppression that resulted from using computer communication alone. This supposition was not supported. Results of this study appear to indicate that FtF discussion in groups using GDSS technology may not overcome the suppression of information or expert influence.

Perceived influence from legitimate authority was also significantly less in groups using GDSS technology than in N-GDSS groups. Previous research suggested that members remain aware of this source of influence despite the use of computer communication (Lea and Spears, 1991:424), and that persons of authority exert more

62

influence than others even when using a GDSS (Lim, Raman, and Wei, 1994:206). While this may be true, results here indicate that members perceive significantly less legitimate authority than those members in N-GDSS groups. Unlike the research of Lim, Raman, and Wei (1994), this study did not investigate the impact of influence attempts from persons occupying positions of legitimate authority. Therefore, although persons who use legitimate authority to influence others may exert more influence attempts, these attempts are perceived less by the other group members using GDSS technology than those in N-GDSS groups.

Like the influence modes above, members using GDSS technology in an actual setting perceived significantly less referent influence than members in a N-GDSS group. These results agree with previous research noted in the review of literature. Findings here lend support to the research performed by Sproull and Kiesler who noted that individuals are less cognizant of social differences when using computer communication (1986:1492). Furthermore, the anonymity feature of GDSS technology appears to mitigate the strong influence of high-status members as suggested by other researchers (Er and Ng, 1995:78).

Previously, there was no research regarding the impact of reward or coercive influence when using GDSS technology. Past literature frequently stated the assumption that the anonymity feature of GDSS technology would mitigate coercive influence (Lim, Raman, and Wei, 1994:202; Er and Ng, 1995:78). Since reward influence is frequently considered the converse of coercive influence, it was hypothesized that GDSS technology would limit the effects of this influence as well. Findings in this research project confirm these assertions, indicating that members of GDSS groups perceive significantly less influence from these sources than do members of N-GDSS groups.

Results from this study did not confirm the supposition that, when comparing GDSS and N-GDSS groups, group members perceived a significantly higher ability to influence others when using GDSS technology. This effect occurred even though group members were able to influence each other verbally in addition to using communication via the computer. Even though previous research found that GDSS technology eliminated "production blocking" (Valacich, Dennis, and Connolly, 1994:463), results here indicate that equal access to the communication medium in GDSS groups does not increase group members' perceived ability to influence others. Although Lim, Raman, and Wei concluded that groups using a GDSS produced a greater amount of influence behavior (1994:207), results in this research project show that GDSS group members perceive less influence than N-GDSS group members. Results here indicate that the GDSS technology provides no actual benefit over traditional N-GDSS groups.

Recommendations for Managers

Managers should be aware that individuals using GDSS technology may be less susceptible to the influence attempts of others. This research suggests that, when using GDSS technology, members are less likely to forfeit their own opinions or beliefs than members in a N-GDSS group as a result of social influence exerted by other persons in the group. Using the model presented by French and Raven, this study suggests that GDSS technology can provide a "barrier" to the influence attempts of others (see figure below). GDSS technology may be best employed when managers wish to "get to the root" of an issue, but may not be an effective tool to persuade group members to change their psychological state.

It should be noted, however, that situations may exist in which managers will not want to diminish the social influence of expertise. If a person with special expertise about a certain subject has been brought into the group, reducing the expert influence this person is able to exert may occur in a GDSS setting. In such an instance, it may be useful to eliminate the anonymous interaction aspect of GDSS technology.
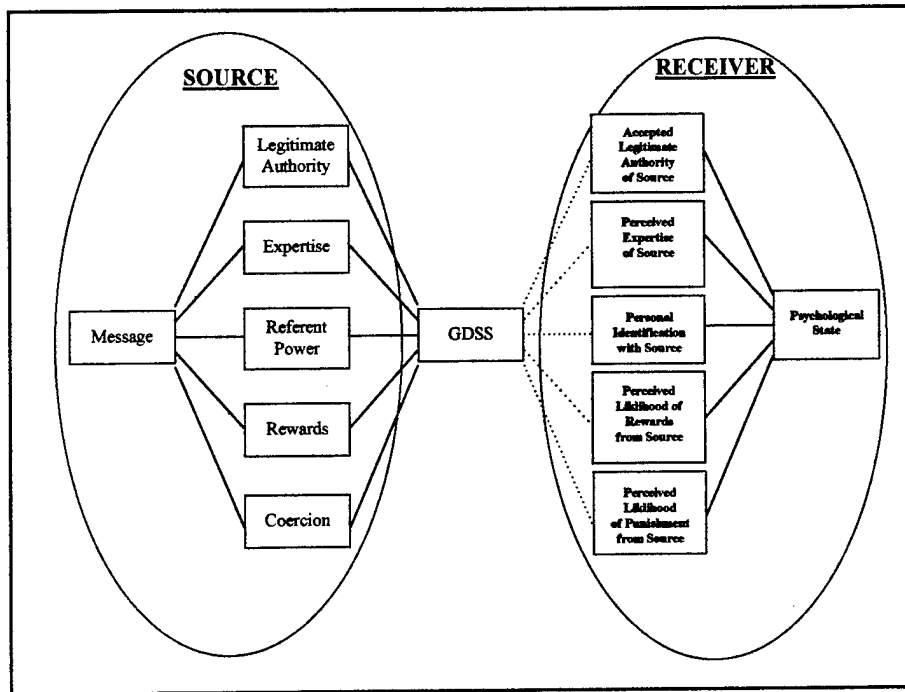
Figure 15. Impact of GDSS Technology on Influence Sources

Furthermore, this research suggests that managers cannot expect that members will perceive a greater opportunity to influence others in a GDSS setting than they would already have in a N-GDSS environment. This study indicates that such a benefit does not exist, and that managers should not select the GDSS option simply in hopes of capitalizing on the benefit of parallelism as a means to enhance group influence.

Limitations

There were many limitations encountered during this research project, which are presented here. Due to the nature of the study, many trade-offs were made between practical realities and study limitations.

Due to the realities of field research, hope of experimentation regarding this study was precluded. The researcher did not manipulate extraneous variables, such as the nature of the particular task or the agenda used by groups, that may have impacted study results. Thus, variability existed between groups regarding the type of task performed, length of time groups met, adherence to agenda items, impact group leaders (in N-GDSS groups) or facilitators (in GDSS groups) may have had on group dynamics. A moderating variable, which was the skill or effect of leaders or facilitators was not controlled for in this study.

Furthermore, the methodology used in the study was dictated by the research questions investigated. Since this research examined a variety of influence modes found in actual groups, these modes could not be easily replicated in a laboratory setting. To control for this limitation, the instrument used to collect data was pilot-tested and refined to reduce confusion and improve measurement of dependent variables.

As in any research, the impact of time and resources played a considerable role in limiting the methodology selected. These limitations prompted the need to use a survey instrument for data collection. It would have been fiscally and logistically impossible for the researcher to personally administer the survey to all participating groups in the timeframe required. This limitation may have resulted in variability regarding administration of the survey instrument. The researcher attempted to limit this possible effect by discussing survey administration with each individual proctoring the survey.

Suggestions for Future Research

There are several questions which future researchers could examine regarding the use of GDSS technology and influence modes. In particular, three possible research questions are presented in this section.

This study examined the effect of GDSS technology upon social influence sources. Raven (1965) asserted that influence could be either socially-dependent or socially-independent, as described in Chapter 2. He argued that message content was more important than the nature of social influence (Raven, 1965:372). If possible, and if an instrument could be devised to assess "message influence" rather than "social influence," future research might examine if "message influence" is greater in GDSS groups vice N-GDSS groups. However, Kelly, Jackson, and Hutson-Comeaux warn that these influence modes may not be mutually-exclusive (1997:11).

Patterns of influence may change depending on the environment in which GDSS technology is used. Influence modes were examined in this study between GDSS and N-GDSS groups which met in a FtF environment. While GDSS technology significantly reduced perceived influence modes in this setting, results may differ when examining influence modes in a distributed GDSS environment. Gavish, Gerdes, and Sridhar note that differences between GDSS and N-GDSS interactions "become more acute" when members interact in a distributed environment—either from various sites, various times, or both (1995:722). A distributed environment would force individuals to become more dependent upon the computer as the primary communication medium, and would reduce or eliminate any effect of verbal communication. Individuals in such an environment may perceive different levels of expert, legitimate authority, and referent influence in this

situation, while influence modes of reward and coercion are still likely to be minimal in such an environment. To determine the effects of a distributed GDSS upon influence modes, future research may compare findings from this study to groups using a distributed GDSS.

In addition, it would be interesting to examine whether influence patterns change in a GDSS environment (as opposed to a N-GDSS setting) with regard to the type of task: intellective or judgmental. Research in FtF groups indicates that influence modes differ with regard to the task being performed by the group (Kelly, Johnson, and Hutson-Comeaux, 1997:19). Understanding if these influence patterns persist when using GDSS technology in support of different tasks could help managers determine if the technology provides a useful benefit when addressing a specific type of task.

Conclusion

This study indicated that GDSS technology, used in an actual environment, inhibits the five influence sources perceived by group members in comparison to N-GDSS group members. These findings occurred even when groups were able to communicate freely in a FtF setting—indicating that FtF communication does not overcome the significant mitigation effect GDSS technology has on social influence sources. Managers should understand this mitigating effect of the technology, and should critically determine how this effect may impact their group meetings or the decision-making process. Results here indicate that GDSS group members will be less susceptible to influence attempts as opposed to members in a N-GDSS environment and, therefore, will be less likely to alter their psychological states when using GDSS technology.

Group Influence Effects Survey

Are you military or civilian (circle one)? **Military**   **Civilian**

What branch of service are you in (circle one)?   **USAF   USA   USN   Other** _____

What is your rank/grade? _____

   If this is not applicable, please state your relationship with the DoD (i.e., contractor):_____

Approximately how long have you known other group members you are currently meeting with?

   _____years _____months   **Other** _____(i.e., "4 days," "One week," etc.)

Circle the item best describing your role in this meeting: **Group Leader   Group Member**

1. During the meeting you just attended, how important were the items below in **influencing you**. If an item was:

   not important to you at all, mark a low number on the scale.
   very important, mark a high number on the scale.
   somewhat important, mark a number from the middle range.

a. the **expertise** of a group member.	Unimportant ① ② ③ ④ ⑤ Important	
b. a group member's **rank** or **grade**.	Unimportant ① ② ③ ④ ⑤ Important	
c. a member you **identify with personally**.	Unimportant ① ② ③ ④ ⑤ Important	
d. **incentives** offered by a group member.	Unimportant ① ② ③ ④ ⑤ Important	
e. **sanctions** imposed by a group member.	Unimportant ① ② ③ ④ ⑤ Important	
f. **knowledgeable** input from a member.	Unimportant ① ② ③ ④ ⑤ Important	
g. **organizational position** of a member.	Unimportant ① ② ③ ④ ⑤ Important	
h. comments from a **mentor** or **friend**.	Unimportant ① ② ③ ④ ⑤ Important	
i. **enticements** offered by a member.	Unimportant ① ② ③ ④ ⑤ Important	

j.	**coercion** by a group member.	**Unimportant**	①	②	③	④	⑤	**Important**
k.	a member's **experience** with the subject.	**Unimportant**	①	②	③	④	⑤	**Important**
l.	the **job** held by a group member.	**Unimportant**	①	②	③	④	⑤	**Important**
m.	a member you **respect personally**.	**Unimportant**	①	②	③	④	⑤	**Important**
n.	**rewards** promised by a group member.	**Unimportant**	①	②	③	④	⑤	**Important**
o.	likelihood of **punishment** by a member.	**Unimportant**	①	②	③	④	⑤	**Important**

2. Please answer the questions by marking the circle below the phrase best characterizing the meeting you just attended.

		Strongly Disagree	Disagree	Neither Agree/Disagree	Agree	Strongly Agree
a.	During discussion, each members' comments influenced me **equally**.	O	O	O	O	O
b.	Every group member was given the **same opportunity** to comment on each topic.	O	O	O	O	O
c.	All comments were **completely discussed** or **reviewed** by all group members.	O	O	O	O	O

Your answers will be used to examine differences in influence methods between "Face-to-Face" meetings and computerized "Group Support Software" meetings. For further information about this study, contact Capt Grant Bridgewater, (DSN) 255-7777, ext.2105.

Thank You for participating in this study.

Group Number: _____

Appendix B: N-GDSS Data

Srvy Nbr	Grp Nbr	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q6,11,16	Q7,12,17	Q8,13,18	Q9,14,19	Q10,15,20	Q21,22,23
				Demographics								Influence Sources										Infl Oppor.					Total Variable Scores			
1	2	2	1	G6	128	2	3	2	3	2	2	5	4	5	1	2	5	5	5	3	2	5	5	4	13	11	13	6	6	14
2	2	1	1	E2	11	2	4	3	4	3	3	4	4	3	3	3	3	3	3	3	3	3	4	4	11	10	10	9	9	11
3	2	2	1	G12	96	2	4	2	3	1	1	4	4	3	1	1	3	4	4	1	1	2	4	4	11	10	10	3	3	10
4	2	1	1	O3	15	2	4	3	4	2	2	5	3	4	2	2	4	3	5	4	4	2	2	2	13	9	13	8	8	6
5	2	1	1	E6	24	2	3	3	3	3	3	4	3	3	3	3	4	3	3	3	3	4	4	4	11	9	9	9	9	12
6	2	2	1	G12	120	2	4	1	3	2	2	5	3	3	1	1	5	3	3	1	1	4	4	4	14	7	9	4	4	12
7	2	2	1	G11	12	2	5	3	4	1	3	5	3	1	3	2	5	3	4	3	3	4	4	3	15	9	9	7	8	11
8	2	2	1	G7	12	2	4	1	4	4	3	5	5	3	3	2	4	4	5	3	3	2	2	2	13	10	12	10	8	6
9	2	2	1	G12	96	2	5	4	5	3	2	5	3	3	1	1	5	3	3	1	1	4	4	4	15	10	15	9	4	10
10	2	2	1	G13	144	1	4	1	4	1	1	5	3	1	1	1	5	1	1	1	1	4	4	4	14	5	6	3	3	12
11	2	2	1	G11	24	2	3	2	4	5	1	4	2	4	4	1	5	3	5	4	1	3	2	1	12	7	13	13	3	6
12	2	1	1	E4	24	2	2	5	4	2	2	2	4	4	3	2	3	5	4	2	5	2	4	4	7	14	12	7	9	10
13	2	2	1	G12	240	1	4	3	3	3	3	4	4	3	3	4	5	4	3	3	2	3	4	3	12	11	11	8	9	10
14	2	2	1	G11	240	2	5	2	5	1	3	4	2	4	1	2	5	3	5	2	2	1	3	2	14	7	14	4	7	6
15	2	2	1	G7	18	2	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	4	2	2	5	3	3	3	3	8
16	3	1	1	O3	19	2	5	4	4	3	3	5	4	4	3	2	5	3	5	2	2	2	4	3	15	11	13	8	7	9
17	3	1	1	O5	5	1	5	1	2	3	4	5	4	4	3	2	5	4	4	2	4	2	4	2	15	9	10	8	10	8
18	3	2	1	G14	10	2	4	3	1	3	3	5	4	4	3	4	5	4	4	4	3	2	4	2	14	11	9	10	10	8
19	3	2	1	G14		1	5	4	1	1	4	5	3	3	1	1	5	3	4	1	1	2	4	1	15	10	8	3	6	4
20	3	1	1	E8		2	5	3	3	3	3	5	5	5	5	1	5	3	5	1	1	4	4	4	15	11	13	9	5	12
21	3	2	1	G12	0.25	2	2	2	3	1	1	5	5	5	1	1	2	3	3	1	2	4	4	4	9	10	11	3	4	12
22	4	1	1	O5	1	2	5	2	3	1	3	4	4	4	1	1	4	4	4	1	1	3	5	5	13	10	11	3	5	13
23	4	1	1	O4	24	2	5	3	3	3	3	5	4	3	3	4	5	4	3	3	2	4	4	4	14	12	11	9	8	10
24	4	1	1	O5	36	2	4	4	3	2	1	4	3	3	2	2	5	4	3	2	2	4	5	5	13	11	9	6	5	14
25	4	1	1	O6	18	1	3	1	2	1	1	4	1	1	1	1	4	2	1	2	4	4	4	4	11	6	5	3	4	12
26	4	1	1	O6	1	2	5	2	3	2	2	5	1	3	1	1	5	3	4	1	1	4	4	4	15	6	10	4	4	12
27	4	1	1	O4		2	3	3	4	3	2	4	3	4	3	2	4	4	4	2	2	4	4	4	11	10	12	8	6	12
28	4	2		G15		2	4	3	2	2	2	4	4	5	2	1	4	3	4	2	2	5	4	4	12	10	11	6	5	13
29	5	1	1	O5	13	2	4	3	2	1	1	4	3	1	1	1	3	3	4	1	1	4	5	4	11	9	6	3	3	13
30	5	2	1	G13	6	2	3	1	1	1	1	5	1	1	1	1	5	1	1	1	1	3	5	4	13	8	3	3	3	12
31	5	1	1	O3	2	2	4	4	4	4	4	4	4	4	4	2	4	4	4	4	4	2	4	3	12	12	12	12	10	9
32	5	1	1	O4	2	2	5	5	3	3	3	5	4	2	3	2	5	4	4	3	2	2	4	2	15	13	9	9	7	8
33	5	1	1	O4	28	2	4	3	4	4	1	5	4	4	3	1	4	3	4	3	1	2	4	4	13	10	12	10	3	10
34	5	1	1	O4	2	2	5	4	2	3	3	5	2	4	3	3	5	1	4	3	3	2	4	4	15	7	10	9	9	12
35	6	1	1	O4	12	2	5	4	3	1	1	5	5	1	1	1	5	4	1	1	1	5	5	2	15	13	8	3	3	12
36	6	1	1	O4	24	2	5	1	4	3	3	5	4	4	4	3	5	4	5	3	3	4	4	4	15	9	13	10	9	14
37	6	1	1	E5	6	2	5	2	3	4	2	4	3	2	2	1	3	2	4	4	3	2	5	5	12	7	9	10	6	9
38	6	1	1	O4	36	2	4	2	1	1	1	5	3	2	1	2	5	4	4	2	2	2	5	5	14	9	7	4	6	14
39	6	1	1	O4	2	2	4	3	3	2	4	5	4	4	3	5	4	5	4	3	2	2	5	5	14	11	12	10	10	12
40	6	1	1	O4	12	2	1	2	1	1	1	1	5	1	1	1	1	5	1	1	1	2	2	2	3	12	3	3	3	4
41	7	1	1	O6	5	1	5	1	1	1	1	5	4	3	1	1	5	3	5	1	1	4	4	4	15	8	9	3	3	14
42	7	1	1	O5	3	2	5	1	1	4	4	5	4	4	2	1	5	5	2	2	2	4	5	5	15	10	10	8	7	14
43	7	1	1	O4	0.75	2	5	4	2	3	4	5	4	3	3	2	5	2	4	2	2	3	5	4	15	10	9	8	8	13
44	7	2	1	G13	2	2	5	3	3	2	3	5	5	2	2	1	5	5	4	1	1	4	5	5	15	13	9	5	5	14
45	7	2	1	G13	3	2	3	1	3	1	1	5	3	1	1	1	4	2	4	1	1	4	5	5	12	4	8	3	5	13
46	7	1	1	O4	2	2	5	3	5	3	1	5	3	3	1	1	5	4	5	1	1	2	4	2	15	10	13	5	3	12
47	7	2	1	G13	2	2	4	1	1	1	1	4	1	1	1	1	3	1	1	1	1	4	4	4	11	3	3	3	3	11
48	7	2	1	G14	6	2	4	3	3	3	2	4	4	3	2	2	4	4	4	3	2	2	2	2	12	11	10	9	6	10
49	7	2	1	G13	6	2	5	3	2	1	1	5	2	3	1	1	5	3	4	1	1	4	4	4	15	8	9	3	3	14
50	8	1	1	O5	1.5	2	4	3	4	4	3	5	4	5	4	2	5	3	5	3	2	4	6	4	14	10	14	11	7	14
51	8	1	1	O5	8	2	5	2	1	4	4	5	3	2	1	1	5	3	4	1	1	4	4	4	15	8	7	6	6	12
52	8	1	1	O6	1	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	2	4	4	7	3	3	3	5	8
53	8	1	1	O5	0.25	2	5	3	4	4	4	5	2	3	3	1	5	4	3	2	2	2	3	3	15	6	10	9	7	12
54	8	1	1	O5	38	2	5	3	4	3	3	5	4	3	2	1	5	4	5	2	2	3	4	3	15	11	12	7	6	13
55	8	1	1	O4	13	2	4	2	4	2	3	4	4	4	3	3	4	4	3	3	3	2	4	4	12	12	12	8	9	10
56	8	1	1	O4	26	2	4	2	4	2	3	5	4	4	2	2	5	5	5	2	2	3	5	4	14	11	13	6	7	13
57	8	1	1	O3	12	2	5	5	5	3	1	5	5	5	1	1	5	5	5	1	1	2	5	4	15	15	15	5	3	12
58	8	1	1	O4		2	5	2	4	3	3	5	3	3	4	1	4	3	4	3	3	3	3	3	14	8	12	9	7	12
59	8	1	1	O4	18	2	5	2	3	4	3	5	3	5	2	3	5	3	5	3	3	2	4	4	15	8	13	9	9	11
60	8	1	1	O4	24	2	5	1	3	3	2	5	4	4	3	2	5	3	3	2	2	4	5	4	15	8	10	8	6	14
61	8	1	1	O3	24	2	5	3	4	3	1	5	4	4	2	2	5	5	5	1	1	2	4	4	15	12	13	6	4	10
62	8	1	1	O3	1	2	4	4	3	3	3	4	4	3	3	3	4	4	4	3	3	2	4	4	12	12	10	9	9	10
63	8	2	1	G13	24	2	5	2	2	2	4	5	2	3	2	2	5	4	4	2	3	2	4	2	15	8	9	6	9	12
64	9	1	1	O4	8	2	4	3	4	1	1	5	3	4	3	1	4	4	4	3	1	2	1	1	13	10	12	6	5	11
65	9	1	1	O4	3	2	5	4	3	2	1	5	4	3	2	1	5	4	5	3	2	1	2	2	15	12	11	8	8	11
66	9	1	1	O4		2	5	3	1	1	2	3	4	3	2	1	5	4	2	1	2	2	4	4	13	11	6	4	5	10
67	9	1	1	O6	2	1	5	4	4	4	3	5	4	4	3	4	5	4	4	5	4	2	4	4	15	12	12	12	9	12
68	9	1	1	O4	1	2	5	3	3	3	4	5	5	4	3	3	5	4	3	3	3	2	4	4	15	12	10	9	10	12
69	9	1	1	O4	12	2	5	2	2	3	3	5	3	3	3	2	4	3	3	3	3	2	4	4	14	8	8	9	8	11
70	10	1	1	O4	2	2	3	3	3	2	2	4	4	2	1	1	5	3	4	2	2	3	4	3	12	10	11	6	5	12
71	10	1	1	O5	6	2	4	3	2	2	2	5	4	1	1	1	5	4	3	1	1	4	4	4	14	11	9	5	5	14
72	10	1	1	O6	9	1	5	2	3	2	1	5	3	1	1	1	5	3	4	1	1	4	4	4	15	8	8	4	3	14
73	10	1	1	O4	2	2	5	4	2	2	2	5	4	1	1	1	4	4	3	1	1	4	4	4	14	12	6	4	4	13
74	10	1	1	O4		2	5	4	3	2	4	5	4	5	1	3	5	4	5	1	3	2	4	2	15	12	13	4	10	12

Appendix C: GDSS Data

Srvy Nbr	Grp Nbr	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q6,11,16	Q7,12,17	Q8,13,18	Q9,14,19	Q10,15,20	Q21,22,23
1	1	2	1	G15		2	5	3	3	1	1	5	3	3	1	1	5	4	5	1	1	1	2	4	15	10	11	3	3	7
2	1	1	1	O8	24	2	5	5	3	1	1	1	5	5	3	1	1	5	5	5	1	1	5	5	4	15	15	11	3	3	14
3	1	1	1	O6	42	2	4	2	4	1	1	1	5	3	5	1	4	5	4	4	1	1	2	4	2	14	9	13	3	6	8
4	1	1	1	O6	12	2	4	3	4	2	3	5	2	4	3	4	5	4	4	2	2	2	4	2	14	9	12	7	9	8
5	1	1	1	O6	12	2	4	1	1	2	1	5	3	1	4	4	4	4	1	1	2	4	4	13	8	8	4	3	10
6	1	1	1	O6	24	2	5	1	3	3	5	5	1	2	2	1	5	4	5	1	1	4	4	4	15	6	10	6	7	12
7	1	1	1	O6	1	2	5	2	5	1	1	4	1	4	1	1	5	4	5	1	1	3	5	4	14	7	14	3	3	12
8	1	1	1	O7	24	2	4	3	3	3	3	5	4	2	4	2	4	3	4	3	2	4	4	4	13	10	9	10	7	12
9	2	1	1	G13	12		1	1	3	2	2	4	1	4	1	1	1	1	1	1	1	4	2	4	6	3	8	4	4	11
10	2	2	4	G13	12	2	5	1	1	1	1	5	1	1	1	1	5	1	1	1	1	5	5	5	15	3	3	3	3	15
11	2	1	1	O4	8		5	1	5	2	2	5	5	5	5	3	5	5	5	2	1		5	5	15	11	15	9	6	10
12	2	2	4	O5	24		5	1	1	1	1	5	1	5	1	1	5	1	1	1	1	3	5	3	15	3	7	3	3	11
13	2	1	2	O5	2	2	3	1	1	1	1	3	3	3	1	1	3	1	1	1	2	5	5	5	9	5	5	3	3	12
14	3	1	1	O4	24	2	5	1	4	5	1	5	4	2	1	1	5	5	1	1	1	4	5	5	15	10	7	7	3	14
15	3	1	1	O4	72	2	4	1	3	1	1	4	2	3	1	1	4	2	4	1	1	4	4	4	12	5	10	3	3	12
16	3	1	1	O5	96	2	3	1	3	1	1	3	2	4	1	1	3	3	5	1	1	4	5	4	9	6	12	3	3	13
17	3	1	1	O3	36	2	5	3	3	1	1	5	4	5	1	1	5	4	3	1	1	4	5	5	15	11	11	3	3	14
18	3	1	1	O4	96	2	4	1	3	1	1	4	1	4	1	2	3	1	3	1	1	4	4	4	11	3	10	3	4	12
19	4	2	1	G14		2	1	1	1	1	1	5	1	2	1	1	4	2	2	1	1	2	4	2	10	4	5	3	3	8
20	4	2	1	G13	6	2	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	4	5	2	5	3	6	3	3	11
21	4	2	1	G12	171	2	3	3	3	3	3	5	2	4	3	3	5	4	3	1	1	3	4	4	13	9	10	7	7	11
22	4	2	1	G14	12	2	3	2	3	1	2	4	2	3	1	1	4	2	3	1	1	3	5	2	11	6	9	3	4	10
23	4	2	1	G11	120	2	5	3	2	2	3	4	2	2	2	2	4	3	3	2	2	3	4	3	13	8	7	6	7	10
24	4	2	1	D4		2	4	1	3	1	1	5	1	4	1	1	4	1	4	1	1	5	5	5	13	3	11	3	3	15
25	5	2	1	G7	10	2	4	5	5	5	5	5	5	5	3	3	5	5	5	3	3	1	5	3	14	15	16	11	11	9
26	5	2	1	G5	108	2	4	2	4	4	4	5	4	5	2	2	5	5	5	2	3	5	5	5	14	11	14	11	8	13
27	5	2	1	G15	240		3	2	2	1	1	4	2	3	1	1	4	3	4	1	1	2	4	3	11	7	9	3	3	9
28	5	2	1	G15	10	2	5	2	3	2	3	5	2	2	2	2	5	2	4	2	1	3	4	4	15	6	9	6	6	11
29	6	2	1	G13	180		4	1	1	1	1	4	4	3	1	1	3	3	3	1	1	4	4	3	11	8	7	3	3	11
30	6	2	1	SES	204	2	4	1	3	1	1	5	3	3	1	1	5	4	4	1	1	2	5	4	14	8	10	3	3	11
31	6	2	1	G13	28	2	5	1	3	1	1	5	1	3	1	1	5	1	3	1	1	3	5	3	15	3	9	3	3	11
32	6	2	1	G12	93		3	1	4	1	1	4	1	3	1	1	1	1	4	1	1	1	5	4	8	3	11	3	3	10
33	5	2	1	G12		2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	4	2	3	3	3	3	3	8
34	6	2	1	G13	12	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	3	4	3	3	3	4	3	3	10
35	6	2	1	G13	120	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	4	3	3	3	3	3	3	10
36	4	2	1	G13	38	2	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	3	4	3	3	3	6	3	3	10
37	5	2	1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	3	9
38	6	2	1	G13	12	2	3	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	9	9	10	9	9	9
39	7	2			36	2	3	3	3	3	2	4	2	3	1	1	4	2	3	1	1	5	5	4	11	7	9	5	4	14
40	7	2			288	2	5	3	3	3	3	5	4	3	2	1	4	2	4	1	3	3	5	5	14	9	10	6	7	13
41	7	1	2		39		1	1	2	1	1	5	1	1	1	1	2	2	2	1	1	4	5	5	8	4	5	3	3	14
42	7	2	2		240	2	4	4	1			4	1	2	1	1	1	1	1	1	1	4	4	4	9	6	4	2	2	12
43	7	1	2		24	2	5	1	3	1	1	5	1	3	1	1	5	1	3	1	1	2	4	1	15	3	8	3	3	7
44	7	2	2		0.06	2	5	4	4	3	3	5	4	4	3	1	5	4	4	2	1	2	5	4	15	12	12	8	5	11
45	7	2			204	2	3	1	1	1	1	4	1	1	1	1	3	1	3	1	1	5	5	5	10	3	5	3	3	15
46	7	2			204	2	3	1	1	1	1	3	1	3	1	1	3	1	1	1	1	3	5	4	9	3	5	3	3	12
47	7	2	2				4	2	1	1	1	5	2	3	1	4	4	4	4	1	1	5	5	2	13	8	8	3	6	8
48	7	2			300	2	2	1	1	1	1	5	1	1	1	1	3	1	2	1	1	5	5	5	10	3	4	3	3	15
49	8	2	3		204	2	5		1	1	1	4	4	1	1	1	5	1	1	1	1	3	2	4	14	5	3	3	3	9
50	8	1	4		4	2	4	4	5	3	3	5	3	4	3	1	5	4	5	1	1	2	5	2	14	11	14	7	5	9
51	8	1	3		2		4	3	4	1	1	4	2	1	1	1	4	1	4	1	1	2	4	4	14	6	9	3	3	10
52	8	2			2	2	3	3	3	1	1	3	3	3	1	1	4	3	3	1	1	2	4	4	10	9	9	3	3	10
53	8	2			0.1	2	5	2	2	2	2	5	2	2	2	2	5	3	2	2	1	3	2	4	15	7	6	6	5	9
54	8	2			1	2	4	3	2	1	1	5	2	2	2	1	5	4	4	1	1	3	1	2	14	9	8	4	3	6
55	8	1	1		3	2	5	2	3	1	2	5	2	3	2	2	4	3	2	1	1	4	5	4	14	7	8	4	5	13
56	8	2	1		0.1	2	4	4	3	5	2	5	5	4	5	1	5	3	5	5	1	1	4	4	14	12	12	15	4	9
57	8	1	2		252	2	5	2	2	2	2	4	2	2	2	2	4	3	4	1	1	4	4	4	13	7	8	5	5	12
58	8	2	3		4	2	5	1	1	1	1	5	2	1	1	1	4	3	2	1	1	4	4	4	14	6	4	3	3	12
59	8	1	2		0.25	2	4	1	3	1	1	4	1	3	1	1	4	1	1	1	1	2	3	4	12	3	8	3	3	9
60	8	1	1		0.1	2	4	3	3	3	3	3	4	2	2	2	3	2	2	2	3	2	4	3	9	10	7	7	8	9
61	9	2	4		8	1	5	4	2	2	2	4	5	2	3	2	5	2	4	2	4	2	4	4	15	8	9	6	10	10
62	9	2			0.1		2	1	3	1	2	5	2	4	3	3	5	4	4	2	1	4	5	4	12	7	11	6	6	13
63	9	1	3		3	2	5	4	4	1	4	4	2	3	1	3	4	4	4	2	1	3	5	4	13	13	10	4	10	12
64	9	1	2		12	2	5	2	3	1	2	4	2	3	1	1	4	3	3	1	1	4	5	5	13	7	9	3	4	14
65	9	1	2		12	2	4	3	2	3	3	4	2	3	3	3	4	3	4	3	3	5	5	4	12	8	9	9	9	14
66	9	2			10		5	5	1	1	1	5	2	4	1	3	5	5	5	1	4	2	1	2	15	12	10	3	8	5
67	9	2			6		5	2	3	1	1	4	1	3	1	1	4	1	4	1	1	4	4	4	12	7	10	3	3	12
68	9	2			7	1	4	4	4	4	3	4	4	4	3	4	5	5	3	4	3	4	5	5	13	13	11	11	10	14
69	9	1	2		10	1	4	3	1	1	2	4	1	4	1	3	4	3	4	1	2	2	4	4	12	7	9	3	7	10

Appendix D: Pilot Test Data

		Demographics					Influence Sources															Infl Oppor.			Total Variable Scores					
Srvy Nbr.	Grp Nbr.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q6,11,16	Q7,12,17	Q8,13,18	Q9,14,19	Q10,15,20	Q21,22,23
Pilot 1	1	2	1	G16	204	1	5	5	5	4	5	5	3	5	3	3	5	1	5	1	1	4	5	5	15	9	15	8	9	14
Pilot 2	1	1	1	E8	39	2	3	2	3	3	3	4	3	4	3	2	4	4	4	3	3	2	4	2	11	9	11	9	8	8
Pilot 3	1	1	1	E7	13	2	5	3	3	3	3	5	5	3	3	1	5	4	3	1	1	2	4	4	15	12	9	7	5	10
Pilot 4	1	1	1	O2	4	2	3	2	4	1	4	5	5	4	2	2	4	4	4	1	1	2	3	2	12	11	12	4	7	7
Pilot 5	1	1	1	E7	76	2	5	1	4	3	4	5	5	4	3	3	5	5	5	2	2	3	5	5	15	11	13	8	9	13
Pilot 6	2	1	1	G10	288	2	5	4	4	5	4	5	5	3	4	5	4	4	5	5	5	4	4	4	14	13	12	14	14	12
Pilot 7	1	2	E6	2	2	5	4	3	3	4	5	4	3	3	3	4	4	4	3	4	4	4	4	14	12	10	9	11	12
Pilot 8	1	1	1	E5	1	2	5	3	5	5	3	5	3	5	4	3	4	3	1	1	1	4	4	4	14	9	11	10	7	12
Pilot 9	2	1	G6	24	2	5	3	3	4	4	5	4	3	4	3	5	5	4	3	3	3	3	3	15	12	10	11	10	9
Pilot 10	1	1	1	E6	9	2	4	2	2	2	3	5	4	4	1	1	5	5	3	3	2	4	4	4	14	11	9	6	6	12
Pilot 11	2	1	G12		1	5	4	4	4	4	3	4	4	3	3	4	3	4	4	3	3	2	3	12	11	12	11	10	8
Pilot 12	2	1	G16	120	1	5	3	4	2	2	5	4	5	2	2	5	4	5	2	2	2	5	4	15	11	14	6	6	11
Pilot 13	1	1	1	E8	30	2	5	1	4	3	3	5	3	4	3		5	3	3	1	3	3	5	4	15	7	11	7	6	12
Pilot 14	1	1	1	O4	12	1	4	2	4	1	1	5	3	4	1	4	5	3	5	1	1	4	5	5	14	8	13	3	6	14
Pilot 15	2	1	G14	168	2	5	4	5	5	5	5	5	4	3	5	5	1	5	4	3	5	5	5	15	14	15	12	13	15
Pilot 16	1	1	1			2	5	1	5	5	5	5	1	5	5	5	5	1	5	4	3	5	5	5	15	3	15	14	13	15
Pilot 17	2	1	G13	260		3	2	2	2	2	4	3	4	2	2	4	3	4	2	2	4	5	4	11	8	10	6	6	13
Pilot 18	1	1	1	E5		2	4	2	3	1	3	5	3	4	2	4	5	4	5	2	4	4	4	4	14	9	12	5	11	12
Pilot 19	2	1	G12	120	2	5	3	3	3	3	5	3	5	2	1	5	3	5	1	5	3	3	3	15	9	13	6	9	9
Pilot 20	1	1	1	E6	48	2	3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	3	4	4	9	9	9	7	7	11

EXPERTISE VARIABLE
RELIABILITY ANALYSIS - SCALE (ALPHA)

		Mean	Std Dev	Cases
1.	Q6	3.6667	1.1127	15.0
2.	Q11	4.2000	1.0142	15.0
3.	Q16	4.1333	.9904	15.0

Statistics for	Mean	Variance	Std Dev	# of Variables
SCALE	12.0000	7.8571	2.8031	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
Q6	8.3333	3.5238	.7409	.8595
Q11	7.8000	3.6000	.8389	.7672
Q16	7.8667	3.9810	.7325	.8612

Reliability Coefficients

N of Cases =   15.0   N of Items = 3

Alpha =   .8800

Appendix F: Legitimate Authority Variable Reliability Analysis

LEGITIMATE AUTHORITY VARIABLE
RELIABILITY ANALYSIS - SCALE (ALPHA)

		Mean	Std Dev	Cases
1.	Q7	2.4000	1.1832	15.0
2.	Q12	3.2000	1.0142	15.0
3.	Q17	3.2000	1.1464	15.0

Statistics for	Mean	Variance	Std Dev	# of Variables
SCALE	8.8000	7.1714	2.6780	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
Q7	6.4000	3.9714	.3817	.8201
Q12	5.6000	3.9714	.5372	.6331
Q17	5.6000	2.9714	.7301	.3654

Reliability Coefficients

N of Cases = 15.0   N of Items = 3

Alpha = .7171

REFERENT VARIABLE
R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

		Mean	Std Dev	Cases
1.	Q8	3.6000	.9856	15.0
2.	Q13	3.1333	1.3020	15.0
3.	Q18	3.8667	1.4075	15.0

Statistics for	Mean	Variance	Std Dev	# of Variables
SCALE	10.6000	9.9714	3.1578	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
Q8	7.0000	6.4286	.5145	.8563
Q13	7.4667	4.4095	.7071	.6609
Q18	6.7333	3.7810	.7691	.5894

Reliability Coefficients

N of Cases =   15.0   N of Items = 3

Alpha =   .8009

REWARD VARIABLE

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

		Mean	Std Dev	Cases
1.	Q9	2.2667	1.2228	15.0
2.	Q14	2.2000	1.0823	15.0
3.	Q19	2.4000	1.0556	15.0

Statistics for	Mean	Variance	Std Dev	# of Variables
SCALE	6.8667	8.9810	2.9968	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Alpha if Item Deleted
Q9	4.6000	3.8286	.7643	.8060
Q14	4.6667	4.2381	.8014	.7685
Q19	4.4667	4.6952	.6933	.8641

Reliability Coefficients

N of Cases =   15.0   N of Items = 3

Alpha =   .8685

77

COERCION VARIABLE
RELIABILITY ANALYSIS - SCALE (ALPHA)

		Mean	Std Dev	Cases
1.	Q10	2.1333	.8338	15.0
2.	Q15	1.8000	.7746	15.0
3.	Q20	2.2667	1.2799	15.0

Statistics for	Mean	Variance	Std Dev	# of Variables
SCALE	6.2000	6.6000	2.5690	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Alpha if Item Deleted
Q10	4.0667	3.6381	.7126	.7696
Q15	4.4000	3.5429	.8427	.6828
Q20	3.9333	2.3524	.6647	.8988

Reliability Coefficients

N of Cases = 15.0   N of Items = 3

Alpha = .8333

OPPORTUNITY TO INFLUENCE VARIABLE
RELIABILITY ANALYSIS - SCALE (ALPHA)

		Mean	Std Dev	Cases
1.	Q21	3.0000	1.1339	15.0
2.	Q22	3.4667	.9904	15.0
3.	Q23	3.1333	1.0601	15.0

Statistics for	Mean	Variance	Std Dev	# of Variables
SCALE	9.6000	6.8286	2.6132	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
Q21	6.6000	3.9714	.3477	.9400
Q22	6.1333	3.1238	.7780	.4573
Q23	6.4667	3.1238	.6887	.5488

Reliability Coefficients

N of Cases =   15.0   N of Items = 3

Alpha =   .7552

79

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Vita

Captain L. Grant Bridgewater was born on 12 February 1966 in Liberal, Kansas. He graduated from Beggs High School in 1984 and entered undergraduate studies at Oklahoma State University in Stillwater, Oklahoma. He graduated in 1988 with a Bachelor of Science degree in Political Science. After entering Officer Training School in November 1988, he received his commission on 17 March 1989 upon graduation.

His first assignment was at Davis-Monthan AFB, Arizona, as the 358th Tactical Fighter Training Squadron adjutant. In February 1991, while at Davis-Monthan AFB, he became the 355th Component Repair Squadron section commander. He also earned a Master's of Business Administration degree from the University of Phoenix. His next assignment was in May 1993 to Seymour Johnson AFB, North Carolina, where he performed duties as Chief, Base Information Management and Support Group Executive Officer. He entered the Information Resource Management program at the School of Logistics and Acquisition Management, Air Force Institute of Technology, in May 1996. After graduation in December 1997, he was assigned to Headquarters, United States Air Forces in Europe.

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13. ABSTRACT (Maximum 200 Words)

This study examined the effect of Group Decision Support System (GDSS) technology on perceived influence modes. The researcher examined perceived influence modes in two group treatments: GDSS groups and non-GDSS (N-GDSS) mediated groups. Actual groups in both treatments performed judgmental tasks of their own choosing. Group members then completed a survey which measured their perceptions regarding five influence sources: expert influence, influence from legitimate authority, referent influence, reward influence, and coercive influence. The survey also measured the extent to which members perceived an "opportunity to influence" other group members. For each variable measured in both treatment groups, mean scores were calculated from respondents' ratings. Analysis indicated that GDSS technology significantly reduces the amount of influence perceived by group members when compared to members in N-GDSS groups. Results also indicated that there was no significant difference between treatment groups regarding members' perceived "opportunity to influence" other group members.

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    Significant   Significant   Significance

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